Descending Caves:

Descent Narratives and the Subterranean Science and Literature of the Long Eighteenth Century

1680 - 1830

Damian Frank Pearson

Thesis submitted in fulfilment for the degree of Doctor of Philosophy in Literature

Department of English and Creative Writing

Lancaster University

June 2018

Table of Contents

Acknowledgements

Most significantly, I want to thank my supervisor, Professor Simon Bainbridge for his support, encouragement and guidance throughout my research and writing of this thesis. As well as supervising my work, he has given me opportunities to teach, mentor and lecture on this and related subjects. It has often been a deep, dark and labyrinthine process and Simon has been an inspirational and illuminating guide from the start. It has been an extraordinary experience, largely through his reassurance and advocacy.

Professor Sharon Ruston has encouraged and enabled my research into Romanticism and science and has given me many opportunities to teach, mentor, lecture and give seminar papers. She has been a great teacher and colleague. Her critical support has been thorough and immensely productive.

Professor Sally Bushell has been very supportive and gave me the opportunity to teach on the undergraduate Romanticism course. Professor Arthur Bradley has read much of my research and has unfailingly offered guidance and encouragement. Doctor Jo Carruthers has given me many opportunities to present seminar and conference papers and has been consistently encouraging. Professor Catherine Spooner has given me invaluable feedback on draft sections. Professor Lynne Pearce encouraged me to start the research and has offered further encouragement throughout the study. Professor Keith Hanley inspired my fascination with Romantic literature in the first place when he taught me as an undergraduate and working with him as a colleague has proved a further inspiration.

Professor Adelene Buckland's critical analysis and advice has been invaluable and has helped me to develop the thesis in areas I had originally only touched upon. She has helped me make it a better piece of writing.

I want to thank my fellow postgraduate students for their support, their ideas and many discussions: Nour Dakkak, Kate Ingle, Andrew Lacey, Andrew Raven and Michael Regan, though most of all, my friend and office-mate, Muren Zhang. I am indebted also to my erstwhile sixth-form student and now postgraduate colleague, Jennifer Hughes, who has shared a very similar journey through studying at Lancaster.

I am deeply grateful to Professor Malcolm McVicar, Doctor David Parker, Doctor Sui Gang and Hannah Yu-Pearson who read and gave invaluable feedback on an early draft of this thesis. Any remaining errors are mine.

Further gratitude is due David Parker who as an artist, and as my caving and climbing partner, has provided decades of inspiration and collaboration on all things subterranean, mountainous, literary and philosophical. We have discussed and enthused about so much of this thesis since 1970s.

Tim Allen has played a major role in helping this thesis to production. He has given me countless opportunities to write on caving and to present public lectures on caving, as well as encouraging me, with patience and good-humour, to pursue a line in cave photography. He has invited me on international caving expeditions, and for the past eight years has been the leading inspiration for the cave exploration we practise in the Yorkshire Dales.

Much of this thesis is drawn from the practice of cave exploration in Britain and abroad, and for this I am indebted to the following friends for their subterranean help, support, encouragement and camaraderie: Jane Allen, Diane Arthurs, Tony Balmer, Jon Beavan, Bill Bennett, Mark Brown, Judith Calford, Simon Cornhill, Geoff Crossley, Dave Deane, Richard Dowbiggin, Andy Eavis, Joe Giblin, Chris Howes, Matt Kirby, Rebecca Lawson, David Lowe, Brian Marshall, Mick Nunwick, Pete O'Neil, David Rose, Harry Salisbury, Bill Sherrington, Hugh St. Lawrence, Mick Tolley, Andy Walsh, Richard 'Roo' Walters, Bob Windsor and Geoff Yeadon.

Frank Pearson

I have incalculable gratitude to my late mother and father, William and Monica Pearson, who ensured the initial idea of the research could be put into practice, and to my sister, Louise Pilkington, who has been a part of this life-changing process. My final and most sincere gratitude, appreciation and love must go to my wife, Feixia, and our two children, William and Hannah, who have not only been supportive, encouraging and patient throughout, but have accompanied me on many mountain, cave and photography trips, my most hearty thanks.

Abstract

Caves form a major element in both scientific and literary writing in the long eighteenth century and function as a crucial part in the transformation of the perception of wild mountain landscapes. Despite this, the role of caves has been critically neglected. This thesis re-examines the writing of this period to uncover the place and importance of caves. From readings of the catastrophic biblical flood, where caves enabled the flood waters to rise and fall from within the Earth, to a far-reaching synthesis of laboratory and fieldwork experiments into the chemical dissolution of limestone, caves attracted wide-spread scientific and cultural appreciation. The role of water in the formation of limestone caves has been the basis for all theories; the major discoveries and advances in knowledge are in how water forms them. Fused with these discoveries, reworkings of mythological descent narratives in poetry, novels and travel journals led to the evolution of a sub-genre in eighteenth-century literature and nascent ideas of the subconscious. The archetypal form of the classical descent narrative is based on the transformative experience of a descent underground and a return to the surface, and this framed the discourses that represented caves and the experiences of descending them, whether they were tangible or imagined. The changing perception of caves was an influence in many scientific and cultural fields, including: knowledge of earth science and the eventual specialization of geology with the assistance of chemistry, the debates over the meaning of nature and god, the development of aesthetic theories and their application to the landscape, and the growth of domestic travel and tourism. The genres of natural philosophy, poetry, prose fiction and travel writing formed the representational discourse of caves through a remarkable degree of dialogue and intertextuality. Those who wrote in this genre blended the causal and the aesthetic understanding of subterranean space before subject specialization would divide them. The representations, instabilities and transformations of this strange subterranean environment are principally illustrated in the

writings of John Hutton and William Wordsworth at the end of the long eighteenth century. Their pivotal writings absorbed the material that preceded them and shaped it for the scientific and literary writers that followed. They formed the field of cave and karst science and established the cave as the central metaphor for the creative imagination.

Introduction: The Underworld and the Underground

Caves are as much a product of the imagination as they are of natural processes and the purpose of this study is to account for how both literary and scientific perceptions of the underground were formed in the long eighteenth century, between 1680 and 1830, and how they shaped a literary genre and a field of scientific study. The perceptions made during this period established the current knowledge and experience of caves, as creations of complex tectonic and chemical processes and as captivating imaginative attractions. Visitors to caves cannot be indifferent to the vertiginous darkness of these cracks in the earth's surface and the apparent lifelessness of the enclosed space; they can be either repelled by the thought of crossing the subterranean threshold or, equally, compelled by curiosity to enter and explore it. Caves are environments that inspire the imagination and necessitate inquiries into their formation. Much of the writing on caves in the long eighteenth century was part of a broader dialogue between natural philosophers and scientists, poets, novelists and travel writers. The period marked not only a search for caves and the desire to experience them, but the shaping of a discourse that expressed and comprehended these subterranean perceptions.

The exploration and study of caves and the impact on literary and scientific writings of the long eighteenth century has been critically neglected. This thesis explores the overlooked writings and debates of natural philosophers and geologists in charting the development of cave and karst science within the wider field of natural philosophy and then geology, from Thomas Burnet's biblical theories of cave formation to Joseph Black's laboratory experiments and Adam Walker's fieldwork in limestone dissolution, and, arguably, the founding text of modern geology, Charles Lyell's *Principles of Geology*. This thesis draws significant parallels between the scientific interest in caves and the adaptation and development of the descent narrative from classical and medieval sources in both epic narrative poetry, satirical poetry and the novel, creating a distinctive eighteenth-century

literary genre. The thesis re-examines the poetry of John Milton's *Paradise Lost* and John Dryden's translation of Virgil's *Aeneid* and the influence their use of the descent narrative, along with other translations, had on the poets of, among others, James Thomson, Edward Young and William Wordsworth who merged the descent narrative with expressions of the evolving aesthetic of the sublime. The sublime aesthetic developed largely through experiences, both real and imagined, of the alien darkness of caves. I argue that Wordsworth's interest in caves, his use of the descent narrative, the sublime aesthetic and his nascent ideas of the role of the subconscious and the imagination shaped both his poetry and readers' perceptions of the caves of Yorkshire. The descent narrative and the study and exploration of caves also make up considerable parts of the neglected novels of Thomas Amory, who bases much of his extraordinary cave exploration in the Yorkshire Dales. Both the scientific and literary writings were incorporated in the hybrid genre of the travel journal, which saw its development alongside the growth of travel and tourism through the century. This thesis explores eighteenth-century travel writing where the genre of the descent narrative and scientific curiosity played a substantial part. In many of these writings the epic travels and descents to the underworld of Odysseus and Aeneas found parallels in the travels around Britain of, for example, James Brome, George Berkeley and John Hutton. Such interest led to the first cave guidebook written by John Hutton, and subsequent guides by John Housman.

Trevor Shaw, in his extensive landmark study, *History of Cave Science*, addresses the role played by European natural philosophers in their understanding of cave formation up to 1900.[1] He briefly considers the theories of seventeenth- and eighteenth-century natural philosophers, leaving the detailed scientific analysis for the geologists of the nineteenth century. This thesis explores the writings of some philosophers who were overlooked by Shaw,

[1] Trevor Shaw, *History of Cave Science: The Exploration and Study of Limestone Caves to 1900* (Sydney: Sydney Speleological Society, 1979; repr. 1992).

for example, Joseph Black, and places their theories in a philosophical context. As Shaw examines the discovery and understanding of limestone solution in geochemistry, the first discoveries, what he calls 'these early fumblings,' are not considered in any detail until there is a clearer understanding of the chemical processes in the nineteenth century (Shaw, p. 153). This thesis considers these early chemical discoveries as crucial breakthroughs in the changing perception of caves and the natural world. It explores the writings of the philosophers in detail and in relation to each other through their debates and differences and explores their relations with the literary and travel writers of the time. This thesis also considers the period where natural philosophy divided and a branch became subterranean geology.

Marjorie Hope Nicholson, in her *Mountain Gloom and Mountain Glory*, explores the development of the aesthetics of nature from the seventeenth to the eighteenth century through the poetry of, for example, Thomson, Young and Wordsworth.[2] The transformation in the way mountain landscapes were perceived, she argues was: 'one of the most profound revolutions in thought that had ever occurred' (Nicolson, p. 3). Though her focus is on mountain landscapes, she does briefly refer to the role of caves. This thesis has caves and the genre of the descent narrative at the centre of the study, and explores them through the interrelations with philosophy, science and travel writing as part of this 'profound revolution.'

Recent studies into the literary and scientific writing of the late eighteenth and early nineteenth century have emphasized a more comprehensive form of literature than is currently apparent with subject specialisms. Sharon Ruston writes that 'literature and science constitute an exciting sub-field within the larger discipline of Romantic-period literature.'[3] Ralph O'Connor, in *The Earth on Show*, argues that the distinction between science and

[2] Marjorie Hope Nicolson, *Mountain Gloom and Mountain Glory. The Development of the Aesthetic of the Infinite* (Seattle: University of Washington Press, 1959; repr. 1997).
[3] Sharon Ruston, *Creating Romanticism: Case Studies in the Literature, Science and Medicine of the 1790s* (Basingstoke: Palgrave Macmillan, 2013), p. 2.

literature in the seventeenth and eighteenth centuries was not as clearly marked as it is now.[4] Literature then, he writes, 'was a more inclusive concept, incorporating scientific and historical writing as well' and that science writing was not merely a part of literature but that 'scientific writing was literature' (O'Connor, p. 13). In the nineteenth century natural philosophy and literature became increasingly specialised and distinct in their subject boundaries. However, it was from this more comprehensive practice of literature that such specialisms were drawn: 'Geological writing, then, emerged at the beginning of the nineteenth century from a confluence of disparate genres' (O'Connor, p. 23). Noah Heringman is more precise when he argues that 'poetry and geology in later eighteenth– and early nineteenth-century Britain are mutually constitutive through the common idiom of landscape aesthetics.'[5] The focus with these studies is the turn of the nineteenth century, the Romantic era, where, Ruston writes, 'a second scientific revolution' took place as natural philosophy transformed into science, or more precisely in this case, geology (Ruston, p. 2). This thesis explores the varied literature of caves in the period between what Nicholson perceives as a revolution in landscape aesthetics at the turn of the eighteenth century to what Ruston describes as a scientific revolution at the turn of the nineteenth century.

The materiality of the mountain landscape, Heringman writes, is 'essential to aesthetic experience because it makes viable the notion of involuntary aesthetic response' (Heringman, p. 1). This response is particularly well described in the poems, novels, natural philosophy and travel accounts of the experience of caves where the all-encompassing materiality of rock and water impresses itself upon the mind and body of the visitor. The perplexing space of a cave inspires imaginative responses and prompts questions of its formation. Heringman writes of this association: 'By marking out a chaotic space in rocks and

[4] Ralph O'Connor, *The Earth on Show: Fossils and the Poetics of Popular Science, 1802 – 1856* (Chicago: Chicago University Press, 2007).
[5] Noah Heringman, *Romantic Rocks, Aesthetic Geology* (New York: Cornell University Press, 2004), p. 1.

landforms, literary description helps to create the province of geology as an autonomous and imposing field' (Heringman, p. 11). Descriptions of caves in the inclusive literature of the long eighteenth century did this for the subterranean aspect of the field of geology. The unique space of the cave, however, makes this aspect of geology different from other aspects. Edward Casey's concept of 'displacement', though not applied by him to caves, is helpful here in that it marks out the cave as a space other than those of the accessible surface environments, however mountainous.[6] The cave is 'displaced,' or dislocated in darkness, from approachable open and illuminated spaces. Casey argues the departure from a place of familiarity into an unfamiliar space could lead to a series of displacements as progress into a cave becomes increasingly difficult (Casey, p. 194). Entry and progress in a cave consists of the crossing of thresholds into a distinctive, uncommon and challenging environment. Such an environmental displacement as this affects the 'involuntary aesthetic response' Heringman writes about. The wildly varied and divergent nature of cave space is important in the development of aesthetic responses to nature and to the development of what will become geology.

This thesis not only examines different genres, it examines the largely neglected work of eighteenth-century cave-related scientific, literary and travel writers, as well as re-examining established classics. The thesis present two case studies of the writers John Hutton and William Wordsworth, who in the latter half of the long eighteenth century, made a major scientific and literary impact with their experience and writings on caves. It is evident that the field of cave and karst science is formed, that the descent narrative genre, combined with the sublime aesthetic, emerges and gives rise to nascent literary forms of the subconscious, and that the attraction of caves motivates the increased popularity of travel and tourism in the long eighteenth century. The interdisciplinary exploration of the philosophy, science, travel and literature of this material adds to our knowledge of the period by placing caves, a major,

[6] Edward S. Casey *Getting Back into Place: Towards a Renewed Understanding of the Place-World* (Bloomington: Indiana University Press, 2009), p. 195.

though overlooked, landform in direct relation to them. Such a study of caves and the significance of rediscovered descent narratives transforms perceptions of familiar texts in an unfamiliar subterranean context, which in turn transforms perceptions of caves.

Structure.

This thesis aims to explore the possibility of defining cave space, a space distinguishable by the difficulty in seeing it, and the ways in which perception of it is expressed. I aim to explore perceptions and representations of caves in science, philosophy, poetry, the novel and travel writing. What is extraordinary about this period of natural exploration and writing is the dialogue between the writers of different disciplines in relation to caves. To demonstrate the interconnected nature of cave writing in the long eighteenth century, I present five proposals, each being apparent in the following five chapters. The first three chapters explore the broad experience of caves through changing scientific knowledge, the role of fiction and changing aesthetic appreciation and cave travel writing, while the final two chapters are case studies of John Hutton and William Wordsworth and the roles their writing played in transforming responses to caves. Firstly, developing knowledge of the formation of caves, a marginal sub-section in the assemblage of the catastrophic flood theory drawn from the Bible, was instrumental in transforming natural philosophy and in establishing the geological sciences in the eighteenth century. This transformation came through the discoveries, in mid-century, of the chemistry of limestone solution and its application to caves in the field. Secondly, the role of classical descent narratives and the application of the sublime aesthetic in the poetry and the novel of the eighteenth century encouraged the exploration and experience of caves from both a scientific and psychological perspective. Thirdly, the rise of domestic travel and tourism in the eighteenth century led to a transformation of and an increase in the number of travellers recording cave phenomena, who drew upon natural philosophy and fiction in expressing their experiences. Fourthly, John Hutton's writing of the first cave guidebook had

a huge impact on the popular perception of caves in the later eighteenth century, and led to the establishing of 'fields' of cave study and experience, making use of both scientific discoveries and fictional descent narratives. Fifthly, the poetry of William Wordsworth established the underground as the central metaphor for the creative imagination and the subconscious, as well as shaping reader's responses to the caves and karst landscapes of the Yorkshire Dales. What ultimately ties the scientific, aesthetic and psychological perspectives together is the way the writers and explorers of the period perceive the unknowable enormity of cave space and yet establish the sense of a local place, for example, the Weathercote Cave system in Chapel-le-dale, West Yorkshire, as a basis for exploration and understanding.

The choice of time and the selection of texts are determined by the inception of a systematic study of caves which, as both Shaw and Nicolson argue, occurs along with the more coherent, concerted and organized study of science in the latter half of the seventeenth century. This development coincides with and generates a crisis in the religious belief of the afterlife, the rise of nature travel and tourism in Great Britain, the development of aesthetic perceptions of the natural world and initial ideas about the form, function and content of the imagination and subconsciousness, all of which draw on the experience or imagination of caves.

The first attempt at a coherent articulation in English of the formation of the earth, and therefore of caves, came from Thomas Burnet and his *A Sacred Theory of the Earth* in 1684, which coincided with the early development of the Royal Society. Other theories were published that either supported or challenged Burnet's propositions, and between them they established a genre of theoretical proposals on the formation of the earth. These texts form the basis of the natural history of caves and the shaping of an understanding of the underground at the beginning of the long eighteenth century.

Two highly influential epic poems were published in the later years of the seventeenth century, John Milton's *Paradise Lost* and John Dryden's translation of Virgil's *Aeneid*. Both incorporate elemental descent narratives that shaped the understanding of the underworld in the eighteenth century. Other classical and medieval descent narratives that were translated in the long eighteenth century are also considered.

With the growth of domestic travel and tourism, both the natural history of caves and the descent narrative became a formative part of the hybrid discourse of travel writing. Travel journals and guidebooks included discussions of natural history and the poetry of descent narratives, and these journals, letters and diaries were then partially responsible for early forms of the novel. In the latter half of the eighteenth century, many of the travel journals written about the Yorkshire Dales, refer to the first cave guidebook written by John Hutton. Hutton absorbed the earlier literature on caves and descent narratives, out of which he constructed a cave discourse that influenced the generation of guidebook writers that followed him.

In the early nineteenth century, Charles Lyell articulated a sophisticated geochemical explanation of the formation of caves, and William Wordsworth wrote poetry that presented the underworld as a contemporary metaphor for the imagination and a nascent form of subconsciousness. Both writers had absorbed the underground and underworld explorations of the eighteenth century and established coherent discursive frameworks for what was to follow. They were both a part of a complex series of intellectual dialogues that began with Milton, Dryden and Burnet.

Most of the texts included in this study are drawn from relatively overlooked texts of natural history, travel writing, discourses on the nature and place of hell, and descent narratives in poetry and the novel. Those texts that are more familiar are included due to the way they address caves. The fascinating point about the understanding and perception of

caves in the long eighteenth century is the deliberately integrated discourse of a range of disciplines. The long eighteenth century is the inception period of contemporary knowledge and awareness of the underground.

Cave Context.

Caves are massively distributed in time and space; they exist in a range of rock types though the dominant and most complex forms of caves exist in limestone, found on every continent, including Antarctica. One of the hardest materials on earth is relentlessly worn away by one of the softest materials, water. It is a hard material that was once fluid: a warm shallow tropical sea with the calcium of dead creatures falling through it to create a lime mud, before being buried and subjected to planetary pressures and heat and ultimately lithified, then raised by tectonic forces to the surface to be weathered and worn down by the rain. Subjected to the chemical corrosion of carbonic acid in rainwater and mountain run-off, the joints in limestone are the inception horizons of caves as they gradually succumb to dissolution. Caves are formed from the flow and percolation of water, following the joints horizontally and vertically through the rock. Phreatic caves are filled with water and create round or ovoid shaped passages; vadose caves have water running freely and cut down to create rift or canyon passages. Many caves have been and are both phreatic and vadose as water levels fluctuate. Individual caves follow the complex joint structure of the limestone and interact forming large networks down through the limestone beds. Over thousands of years these systems develop on many levels, the number and depth depending on the thickness of the limestone block. They are full of water or abandoned. They have been filled in with flood debris, sedimentation, flowstone or roof and wall collapse, or the acidic water has dissolved the collapsed limestone and invasive streams have reworked the sediment banks forming new cave passages to avoid the impassable blockages. Dissolution rates depend on the rainfall, the temperature, rock, soil or vegetation cover. Rainwater picks up carbon dioxide from the

atmosphere, and more from the vegetation and soil cover, as it runs across impermeable rock onto the permeable limestone. Water percolates through the rock dissolving the calcium carbonate as it does so, releasing it in the transformed pressure and temperature of the cave creating speleothems, such as stalactites, stalagmites and flowstone. The water creates the cave and the water fills it up again. Glaciers can stop the flow of water by freezing it but then releases vast quantities through melting, and once a cave is open it is subjected to erosion like any other rock and landform as vast quantities of sediment are transported through. Caves are affected by tectonic forces and faulting; anything that creates a weakness that acidic water and sediment can corrode or erode. Collapse and deposition from the surface can fill passages in again, before another wave of dissolution begins. This is the underground, where gaps and ruptures open and close, where cracks and nooks reveal and conceal. It is a space constantly undergoing change in both historical and geological time. Caves are unlike mountains in that they are difficult to see from the detached position of the observer. To see them extensively, the observer must enter and experience them. However, the darkness of the cave ensures the observer only sees what they can illuminate. The complete physical extent of caves can never be fully discovered, nor can the complete number of them be found. Caves will always remain the environment of the concealed and unknown, or as eighteenth-century writers commonly put it: 'the hidden recesses of nature.'

Caves may be concealed but they remain deceptively immanent in the imagination, as does any unseen phenomena that is intuitively known to lie beneath a visible surface. When setting out to venture into an unknown environment that is not visible, the explorer's imagination, along with their senses and reason, prepare the ground. Geographer, John Logan Allen observes, 'No exploratory venture begins without objectives based on the imagined

nature and content of the lands to be explored.'[7] Explorers cannot help but consider all they have heard and read about the objectives of their journey, even if they reject it as superstition or simply inaccurate, it remains part of their thinking. Allen, when considering the intolerable nature of blank spaces to a geographer, writes,

> The process of exploration is conditioned by the imagination. […] It is the realm of poetry that man's imagination seats itself, and surpasses reason in the creation of images of the unseen. Imagination, then, must be viewed as critical for the processes of geographical exploration by which unknown lands are brought within the horizons of human experience. (p.42)

Allen and fellow geographer, John Wright, use the classical metaphor of the Song of the Sirens from Homer's *Odyssey*, where the magical Siren's lure those curious for knowledge of the unknown to their ruin through an obsession from which they cannot escape. When accounting for the desire to venture into the unknown, Wright observes, 'Terra Incognita: these words stir the imagination. Through the ages men have been drawn to unknown regions by Siren voices.'[8] For some, it is not just the unknown on the earth but the unknown that lies below that poses the greatest curiosity and temptation. Wright's and Allen's writing explores the necessary collaboration between science and the imagination in the process of geographic exploration. They suggest a landscape of the mind needs to be constructed before approaching the unknown and mapping it. The underground is unlike any other unexplored space in that it is entirely and predictably enclosed by rock, filled with water and washed in sediments, and has no source of natural light; what is created by the imagination is dimension, and, in such darkness, limitless and within all bearings. In an early account of cave curiosity,

[7] John Logan Allen, 'Lands of Myth, Waters of Wonder: The Place of the Imagination in the History of Geographical Exploration,' in *Geographies of the Mind: Essays in Historical Geosophy*, ed. by David Lowenthal and Martin Bowden (New York: Oxford University Press, 1976), pp. 41 – 61 (p. 43).
[8] John Kirtland Wright, 'Terrae Incognitae: The Place of the Imagination in Geography,' in *Human Nature in Geography. Fourteen Papers, 1925 – 1965* (Cambridge, Massachusetts: Harvard University Press, 1966), pp. 68 – 88 (p. 68).

Robert Burton in his *Anatomy of Melancholy* (1621) imagines himself as a hawk flying down into the underground, unable to resist the temptation to see what lies hidden, descending with imagined narratives in mind:

> I would have a convenient place to go down with Orpheus, or Ulysses […] at Aetna in Sicily, to descend and see what is done in the bowels of the earth; do stones and metals grow there still? […] What is the Centre of the earth? Is it pure element only, as Aristotle decrees, inhabited (as Paracelsus thinks) with creatures, whose Chaos is the earth, or with Fairies? […] Or is it the place of Hell, as Virgil in his Aeneid, Plato, Lucian, Dante, and others, poetically describe it, and as many of our Divines think? If it be solid earth, 'tis the fountain of metals, waters, which by his innate temper turns air into water, which springs up in several chinks, to moisten the earth's superficies? […] Or else it may be full of wind, or of sulphureous innate fire?[9]

For Burton, the underground is an unknown darkness, a blank upon which he can project his, and his culture's imagination. He imaginatively engages in a classic descent narrative in search of wisdom with two of the great mythic heroes of the underworld adventure. He has nothing but questions to ask of it, though his rational application of sense and his experience of the earth's surface do provide the basis for these questions. Burton draws a distinction between what he knows from experience and what he has been told, and here lies the origin of attempts to understand the underground. In its bewildering darkness and inaccessibility, the underground is always fundamentally a place of the imagination.

The remainder of this introduction examines further theoretical considerations evident in the texts drawn from the long eighteenth century. These are addressed in sub-sections. They are notions of a genre in the theoretical discourses of earth and cave formation, approaches to the classical descent narrative and ideas of the 'afterlife,' the aesthetics of

[9] Robert Burton, *The Anatomy of Melancholy*, 3 vols (London: Bell, 1927) III, p. 46.

nature, particularly subterranean aesthetics, concepts of space and place, of observation and curiosity and of the embodied, phenomenological experience of the traveller, and the representation of narratives and experiences in defining the cultural idea of the cave.

The Origin of Cave Science.

The first clear traces of cave exploration in Great Britain and Ireland appear towards the end of the seventeenth century when scholars speculated about the origin of the earth and the forces and processes that had shaped the contemporary landforms and oceans. At this stage, there was no such study or research called specialized cave science, or indeed geology; those who studied life and the earth studied natural philosophy. A book by a natural philosopher that came close to specializing in cave study was Athanius Kircher's book written in Latin, *Mundus Subterraneous*, published in 1665. It was not a systematic study, rather a collection of experiences and accumulated information with reference to caves gathered from others, including, in a later edition, a letter describing a descent of Antiparos Cave in Greece, in 1673 (Shaw, p. 14).[10] Much of Kircher's description includes the traces of fabulous animals, lost cities, earthquakes and volcanic activity though he does address hydrology. The hydrology of caves is the single most important recurring observation of this book and all the others that address the formation of caves. It is this observation of limestone caves that associates Kircher's book with those written by the natural philosophers in Britain. Rather than an inchoate series of curious observations and speculations, they incorporated their observations of caves into a coherent theory of the earth's formation after the catastrophic flood, described in the Bible's first book, Genesis.

The then current state of the earth's surface was understood to be postdiluvian; the surface was the ruinous remains of the antediluvian world initially created by God. In Genesis

[10] Wordsworth's description of his descent into Yordas Cave in Book VIII of *The Prelude* considers a descent into Antiparos before he settles on Yordas.

the flood was caused when 'the fountains of the great deep broken up, and the windows of heaven were opened' (8, 11). Rain alone could not flood the earth; water contained within the earth's crust had to be released also. Natural philosophers believed the crust was broken by earthquakes which buckled the rock to form mountains and cracked open fissures, out of which poured subterranean water from huge reservoirs. It was back down through these fissures that the water retreated after the ordained forty days and nights of the flood event. The earth's cave systems functioned within God's miraculous catastrophe; they were but a fragment, a part of the ruined cracked infrastructure of the earth's crust. The main fissures were believed to be below the surface of the sea in the deep ocean beds, those evident on land were the smaller less functional drains. Natural philosophers argued that Moses, the disputed writer of Genesis, had given the basic information necessary to understand the miraculous event; the geographic details remained for human reason and observation to discover and understand as part of this complex event of interacting forces.[11]

Martin Rudwick describes how the Bible was also understood to account for the creation of the antediluvian earth and so account for the age of the earth, which was calculated to have been created in 4,004 BC, according to the chronology of Archbishop James Ussher in 1654. The dates were added to chapters of the Bible, the flood occurring in 2,349 BC. Though this appears to be far too short to be of practical geological use, Rudwick argues that the seventeenth- and early eighteenth-century natural philosophers used the Bible to advance their understanding of the earth by transferring the 'messy unpredictable contingency' of human history, evident in the Bible, to that of nature.[12] It was the application of this sense of historicity that provided the necessary way of observing features of the natural world, such as caves, and placing them into a sequence of time in relation to other features. It was ironic, however, that such contingency existed within a biblical narrative of divine

[11] John Hutchinson, *Moses' Principia* (London: Bettenham, 1724), p. 1.
[12] Martin Rudwick, *Earth's Deep History* (Chicago: University of Chicago Press, 2014), p. 5.

necessity. Earth time, according to the Bible, is finite and therefore is subject to the random, contingent events witnessed in history; whereas the classical Aristotelian understanding of the infinite duration of the earth suggests an endless cycle of recognizable processes. This was known by natural philosophers as 'eternalism' (Rudwick, p. 27). Rudwick argues that the perspective of the biblical natural philosophers was the dominant one then, though there were doubts as to the authenticity of Moses' narrative, as to whether it had been written by him and whether it had been corrupted over time. Others were unsure as the initial cause of the flood: at what point did God's miracle occur, how far down the path of causality could the philosopher go until they were tampering with the power of God? Others believed in Aristotle's perspective of eternalism, though until the mechanisms of mountain building could be understood, this had a single major flaw: the rivers would erode all the mountains to the plains. It is evident that books were becoming an obstacle to learning about natural processes. It was clear to natural philosophers, and anyone who worked the land, that natural cycles do occur and are crucial to any understanding of the earth or parts of it. Daily observation and experience told tales more emphatically than ancient manuscripts, though the manuscripts were understood to provide the framework that made sense of all the experience. It was this historical approach to understanding the natural world and the equally evident contingent events that ultimately highlighted the anomalies that existed between scripture and empirical observation. However, it was the initial combination of scripture and empiricism that provided illumination.

It was then perhaps inevitable that the greater the application of reason, experimentation, measurement and empirical observation in the field, the greater the generation of anomalies with scriptural revelation. This empirical process was not entirely directed into observing the material workings of nature though the editors and fellows of the Royal Society encouraged people to get out into the field and record their observations, they did not aim to discard books. The Royal Society also believed the rational process to include

the exploration of libraries: 'And here I earnestly implore the Ayde of all the Learned, and the Noble Patrons of learning, to bring into publick Light the Treasures of Libraries, before they be sacrificed to worms and putrefaction.'[13] The editors do not mention the Bible; this text is not food for worms or putrefaction but divine revelation. However, there was a degree of disquiet when one of the greatest philosophers of reason and empiricism of the period, John Locke, appears to be only partially convincing when, in 1689, he adds at the end of his *Essay on Human Understanding* that, after persuading readers not to take the writings of ancient authors as the ultimate truth but instead to trust their own senses and powers of rational observation, they must not forget to accept 'a Testimony from one who cannot err, and will not deceive. Whatever God hath revealed, is certainly true; no Doubt can be made of it.'[14]

From the perspective of natural philosophy, the Bible's scriptures gave their theological and social institutions the grounds of legitimacy. Genesis was the trusted order of this philosophy; however, it also created the grounds for distrust. Stephen Shapin argues that natural knowledge during this period was 'founded in the evidence of nature or of individual reason, not in the say so of traditionally trusted sources.'[15] Locke tried to stress the truth and legitimacy of the scriptures but was hardly convincing given the arguments he presented in his book against accepting such trust. Locke argues that people for the most part take on trust their 'reverenced propositions' that form the basis of their reasoning and sense of right and wrong, and that they rarely challenge these positions out of 'ignorance, laziness, education, or precipitancy' (Locke, p. 34). People also 'pin their faith on the opinions of others […] there is more falsehood and error among men than truth and knowledge' (Locke, p. 502). Locke's

[13] 'Preface to the Seventh Year of these Tracts,' *Philosophical Transactions,* 1671**, 6**, 2087-2093 <rstl.royalsocietypublishing.org/content/6/69/2087.full.pdf+html> [accessed 21 June 2001]
[14] John Locke, *An Essay on Human Understanding* (London: Tegg, 1838), p. 529.
[15] Stephen Shapin, *A Social History of Truth, Civility and Science in Seventeenth-Century England* (Chicago: University of Chicago Press, 1994), p. 16.

final rejection comes from that of authority, that a person should never give their assent to common received opinions from either friends or from the country at large:

> There is no error to be named, which has not had its professors; and a man shall never want crooked paths to walk in, if he thinks that he is in the right way wherever he has the footsteps of others to follow. (Locke, p. 584)

Locke was addressing a wide range of readers though understood that those making the advances in natural philosophy were the practitioners, not lay people. He stresses that those busy with their work must take on trust the opinions and arguments of others; it is how you come to that trust that is important. Shapin argues, and it is evident Locke did also, that the practitioners of natural philosophy are the ones who must distrust others and particularly authorities that demand their assent: 'distrust is something which takes place on the margins of trusting systems' and that, after Locke, the eighteenth century was the 'crucible of distrust in authority' (Shapin, p. 19). Observation and experience would clearly provide the key to change though first it would be necessary to collect groups of observers.

Shapin presents the dominant member of this community in the seventeenth century as the Christian gentleman scholar.[16] Only a person born into property and gentlemanly status would have the time, independence and money to pursue a practical interest in natural philosophy. Many of these men, and records show they were all men, were members of the church or one of the universities and often both. Accepting the biblical theory in this period bound them to the institution of the church and subsequently gave their theories and studies a high degree of legitimacy (Shapin, 1991, p. 281). However, though a considerable number of theologians and gentlemen took on the study of natural philosophy few embraced the branch that was to become geology. Gordon Davies, suggests the lack of natural philosophers

[16] Stephen Shapin, '"A Scholar and a Gentleman": The Problematic Identity of the Scientific Practitioner in Early Modern England,' *History of Science,* 29.3 (1991), 279-327.

studying geology at the close of the seventeenth century was down to three things: firstly, geology did not suit the enthusiasm for laboratory experiments and the use of microscopes or telescopes, secondly, geology did not suit the interest in Linnean classification and, thirdly, those who did pursue geology did so through the advancing of theories of the earth's formation which many natural philosophers dismissed as mere speculation.[17] It does not appear that the time was right for such study. Roy Porter, argues that without a 'broad army of workers bestowing abundant data from diverse terrains' the development of geology will be slow as it relies upon 'antecedent sciences [and] is exceptionally dependent upon deep social and institutional foundations.'[18] The difficulties of recruiting such an army lay in finding people with the time and money to pursue the fieldwork, as well as being able to overcome difficulties with transport and accommodation. A handful of gentleman scholars would never form an army. However, one who did join what was eventually to become a broad army of field workers, was Edinburgh University mathematician and friend of James Hutton, John Playfair, who, a hundred years later, acknowledged this problem:

> The geologist must not content himself with examining the insulated specimens of his cabinet, or with pursuing the nice subtleties of mineralogical arrangement; he must study the relations of fossils, as they actually exist; he must follow nature into her wildest and most inaccessible abodes; and must select, for the places of his observations, those points, from which the variety and gradation of her works can be most extensively and accurately explored.[19]

The diverse terrains and the wildest and most inaccessible abodes that Porter and Playfair identify must include caves, and however challenging the mountainous wilderness would be,

[17] Gordon Davies, *The Earth in Decay: A History of British Geomorphology 1578-1878* (London: MacDonald Technical and Scientific, 1969), p. 96.
[18] Roy Porter, *The Making of Geology: Earth Science in Britain 1660-1815* (Cambridge: Cambridge University Press, 1977), p. 6.
[19]John Playfair, *Illustrations of the Huttonian Theory of the Earth* (Edinburgh: Creech, 1802; repr. London: British Library Historical Print Editions, 2014), p. 138.

it is easy to see why the climb up to and the descent down into dark and wet caves was not seen as so appealing.

However, by the end of the eighteenth century the number of people engaging in fieldwork had increased immeasurably. The specialists visited sites around the country while amateur enthusiasts explored their local region eliciting information from farmers and miners, for example, John Hutton in the West Riding of Yorkshire from his home in Burton-in-Kendal. Rudwick acknowledges this fieldwork in the recording of scientific data, along with the experience and imagination that inspired it:

> It was loaded with sentiments that united elements of romanticism and tacitly pantheistic religion with those of robust, manly Christianity and the gentleman's love of the countryside and its sporting pursuits. Fieldwork was a kind of "liminoid" pilgrimage away from effete urban luxury into a closer commuting with rural nature; it was also initiation and ordeal.[20]

Rudwick's coining of the word 'liminoid' addresses the sense of detachment the fieldworker experiences in the pursuit of natural phenomena; the meaning is 'having the form of a threshold' rather than being one; the experience of crossing a threshold is more perceived than accomplished. However, those engaging in the exploration and study of caves were crossing a threshold, or 'displacement,' into an inhospitable and alien environment and, as such, were embarking on a liminal experience.

Natural philosophers studied books from other cultures in the Middle East to corroborate the occurrence of a catastrophic flood around three thousand years before the present. Though much of this appeared to be based on an archive of books, there was an exploration of caves to extend the study. This geological interest coincided with the

[20] Martin Rudwick, *The Great Devonian Controversy: The Shaping of Scientific Knowledge among Gentlemanly Specialists* (Chicago: University of Chicago Press, 1985), p. 40.

development of an aesthetic appreciation of the natural landscape, particularly of the previously overlooked wild landscapes, which also coincided with the rise in popularity of travel and tourism in Britain, along with the possibility of free time for educated and curious individuals, improved toll roads and accommodation in the remote and isolated regions where the caves were found. Mountains were difficult to access, the caves upon them, even more so. Horizontal caves could be accessed to a point, though vertical potholes required far more equipment than what was then available. The nature of the cave provided the impediment, natural forces and processes ensured that, to a large extent, they were out of bounds. Lighting, for example, was by candle only, which did little to make 'visible' the utter subterranean darkness. The wider geographical context could be studied though the origins of cave science lay in the small number of accessible caves that would now be termed 'show caves.' It was the expansion of this number of caves, and their exploration, that led to the breakthroughs in the knowledge of caves.

Given that the long eighteenth century was a period of growth for adventurous travel in the mountains, and that those embarking on such adventures were tuned to observation and the recording of features and processes, my point of inquiry is the nature of the transformation of natural philosophy into cave science as a branch of geology and how this new group of 'earth observers' brought it about. Shaw argues, 'A true understanding of speleogenesis and the origin of speleothems depended on a knowledge of the chemistry of limestone solution' (Shaw, p. iv). Not only does geology require fieldworkers, it relies on other specialized scientific studies. Any transformation was going to be a challenge, and would need the collaboration and co-operation of the field and the laboratory. In the mid-eighteenth century, it was chemistry and Joseph Black's discovery of carbon dioxide that provided the essential breakthrough in the field of what was to become cave science.

The collection of data, such as maps, diagrams, guides, journals, fossils, minerals, information gathered from local farmers and miners needed to be collated and organised and placed in an interpretive context. This is what the sociologist, Bruno Latour, argues is the mobilisation of resources upon which natural philosophers depend.[21] When the theoretical and practical context no longer provides stability, and discoveries and mobile data that prove to be anomalous cannot be assimilated into it, such a context will need to be replaced with one that does. The anomalies become too numerous and create a 'crisis' for those working in the scientific field as observations and deductions become immiscible and disjointed.

The key text in this argument is Charles Lyell's *The Principles of Geology* (1830), perceived by many as the founding text of geology. It is in this book that Lyell establishes the chemical process of limestone dissolution. Lyell's book drew upon the work of many other geologists and chemists, and though he argues for the process of limestone dissolution, he did not discover it. It has been argued by Shaw that though Lyell and his colleagues grasped the essential process of limestone dissolution, they did not fully understand the chemical complexity of the process nor the morphological aspects of it until much later in the century (Shaw, p. 154). Though Lyell's book establishes geology, it makes no claim for the separate study of caves. Cave study exists on the margins of much wider concerns in the study of rocks and natural processes and is deeply embedded in this broad perspective.

Descent Narratives and Hidden Recesses of Nature.

Running parallel to developments in cave science, and in many ways integral to it, was the cultural interest into subterranean worlds and states of mind. The underground has long been the imaginary location for the mythic underworld, the dark world of the dead. This underworld, however imaginary, was a place and had a topography of elemental subterranean forms: the subterranean rivers and lakes, deep abysses, towering walls, narrow gaps or

[21] Bruno Latour *Science in Action* (Cambridge, Massachusetts: Harvard University Press, 1987), p. 225.

thresholds, labyrinthine passage ways and many descending levels. These must have been drawn from initial knowledge and experience of the underground; the myth of the underworld certainly affected the real experience of a descent into it. The underworld and underground did appear to share the same space. With this relationship in mind, Henri Lefebvre, distinguishes between representations of space and representational space. He argues that representations of space occur when a culture appropriates a space for its social practice, and in the case of the underground, consecrates it as the realm of the dead, the underworld. Representational space of the underworld, on the other hand, produces symbolic works and aesthetic trends, and appears in the form of memories, dreams, images of holes, passages and labyrinths; it generates art and literature:

> From the ancient Romans, the Christian tradition inherited and carried down into the modern world, a space filled with magico-religious entities […] linked to the subterranean (the dead), and all subject to its formulations of rite and ritual. Antiquities' representations of space have collapsed. […] Its representational spaces, however, have survived: the realm of the dead, chthonian and telluric forces, the depths and the heights. Art has drawn and continues to draw on these sources.[22]

Debates continued about the nature and place of hell in the eighteenth century, though it is unlikely that the classical underworld had many fervent adherents; however, as Lefebvre writes, the underworld continued to hold a central place in the cultural imagination. Though the Mesopotamians wrote their epic poem and descent narrative, *Gilgamesh*, four thousand years ago, it was not discovered until 1850. Though it is possible that *Gilgamesh* influenced the poetry and philosophy of the Greeks and Romans, it is unlikely to have had a direct influence on the writers of the seventeenth and eighteenth centuries.[23] Along with the

[22] Henri Lefebvre, *The Production of Space,* trans. by Donald Nicholson-Smith (Oxford: Blackwell, 1991), p.231.
[23] Raymond Clark, *Catabasis: Vergil and the Wisdom Tradition* (Amsterdam: B. R. Grunner, 1979), p. 24.

Christian biblical narratives, the writings of the Greeks and Romans provided the essential sources for the descent narrative. Classical texts were translated up to and throughout the period. Though Homer's descent narrative of Odysseus is the basis for Virgil's descent narrative for Aeneas, it is probably the latter that had the greater impact on the literature of the long eighteenth century. The most highly regarded and influential of these translations was John Dryden's *The Aeneid* (1697), with a later translation by Christopher Pitt (1740), which presented the katabatic adventure of Aeneas, in Book VI. This descent narrative provides much of the topography of the underworld.[24] As Dryden translates:

> The Gates of Hell are open Night and Day;
>
> Smooth the Descent, and easie is the way:
>
> But, to return, and view the chearful Skies;
>
> In this the Task, and mighty Labour lies. (VI. 192 – 195)

Given the inevitability of death, all must make the descent and all are welcome; it is the task of Aeneas to return, like a revenant, from the underworld of the dead. No descent narrative is complete without the return to light, or the 'chearful Skies,' what the Greeks called 'anabasis.' This mythic return is mirrored in the struggle cave travellers present in their climb back to the world of light. Aeneas must find the Golden Bough which is sacred to the underworld goddess, Proserpina, or Persephone, and once found must be taken from the tree and handed to her. If Aeneas is not favoured by the gods he cannot remove it, and here lies the key to the return, he must have a special dispensation from the gods if he wishes to return from death. The key to Aeneas's dispensation was believed to arise from his initiation into the

[24] *Virgil's Aeneid* trans.by John Dryden (London: Penguin, 1997); *The Works of Virgil, in Latin and English. The Aeneid, Volume III,* trans. by Christopher Pitt (London: Dodsley, 1753).

Eleusinian Mysteries, again something only accessible to the chosen few. Philip Hardie sums up the status of Aeneas:

> The ability to go beyond the limits of this world marks the exceptional status of the hero, and gives him access to sources of knowledge unavailable to ordinary mortals. At the same time, both the journey and the initiation into privileged kinds of knowledge give the hero a better understanding of how to lead the limited existence that is in this life, when he returns to his obligations in this world.[25]

The privileged knowledge Hardie refers to is gained by Aeneas meeting the shade of his dead father, Anchises, to learn his fate. In Homer's *Odyssey* with its descent narrative, the Nekyia, Odysseus meets with the blind seer, Tiresias, to learn of his. *The Odyssey* was translated into English heroic couplets by Alexander Pope and his associates in 1725 and then later into blank verse by the poet William Cowper in 1791. As we know from Keats' sonnet, 'On First Looking into Chapman's Homer,' George Chapman's celebrated 1615 translation was still available to readers in the eighteenth century. These remained the essential frameworks for poetic descent narratives in the eighteenth century for poets, novelists and cave travellers. With the concept of a katabatic descent in search of knowledge already suggested by the philosopher Democritus, circa 460 BCE, 'In reality we know nothing – for truth is in the depths.'[26] It is this improbable descent and return from the hidden, secret and isolated recess of the earth's interior that, for the specially chosen, will provide ancestral wisdom, the truth about life and death and the essential meaning of nature. It is unsurprising that such a journey is impossible for ordinary people and that it must be undertaken by those who are extraordinary with permission from the gods.

[25] Philip Hardie*, The Last Trojan Hero: A Cultural History of Virgil's Aeneid* (London: I. B. Tauris, 2014), p. 21.
[26]*Early Greek Philosophy*, ed.by Jonathan Barnes (London: Penguin, 2001), p. 210.

The topography of the underworld and other successful descent narratives are evident in other translations of classical texts, the most influential being Dryden's translation of Virgil' s *Georgics* in 1697, and Ovid's *Metamorphoses* (1717) translated by a variety of writers though principally Dryden and Joseph Addison. The principle descent narratives are found in the tales of 'The Rape of Proserpine,' and 'Orpheus and Eurydice,' while descriptions of the torments of the underworld are presented through the fate of Tityus, Tantalus, Sisyphus and Ixion.[27] Seen through their fate, the underworld is not only a place of no return, it is a place to fear, where even shades can suffer punishment as well as regret. Though Odysseus and Aeneas are the katabatic heroes of the epic poem, Orpheus is possibly the most celebrated descender of classical myth. Orpheus uses the magical power of his art, music and poetry, to persuade Hades not only to permit him entry and exit to the underworld, but also to bring his love back from the dead, unable to relinquish his physical desire for her. His journey is also that of the artist-poet descending into their own 'depths' for creative inspiration, to retrieve memories of childhood, a journey Wordsworth makes in Book XIII of *The Prelude*; he had translated Virgil's 'Orpheus and Eurydice' as a student. Ann Wroe writes of Orpheus's journey:

> This journey of discovery had always been both solitary and dangerous. In the nineteenth century Orpheus was the poet, by compulsion and necessity alone, crossing a threshold and descending into himself. He might be essentially passive and receptive, full of Keats' 'Negative Capability': 'that is, when a man is capable of being in uncertainties, Mysteries, doubts, without any irritable straining after fact and reason.' Or he might be like Shelley, at the very end of his nerves, actively seeking to plumb the depth for 'truth.' The descent might destroy him.[28]

[27] *Ovid's Metamorphoses in Fifteen Books. Translated by the most Eminent Hands* (London: Jacob Tonson, 1717).
[28] Ann Wroe, *Orpheus: The Song of Life* (London: Pimlico, 2011), p.136.

Wordsworth deployed this metaphor in Book III of *The Prelude* (1805): 'Caverns there were within my mind, which sun / Could never penetrate' (III. 246 – 7).[29] No glance would give him access, as Orpheus understood, descent into the 'cavern' was the only option. This metaphor suggests Wordsworth was attracted by the role of the imagination in the descent narrative. Shelley develops the metaphor in his essay, 'Speculations on Metaphysics':

> But thought can with difficulty visit the intricate and winding chambers which it inhabits. It is like a river whose rapid and perpetual stream flows outwards; - like one in dread who speeds through the recesses of some haunted pile and dares not look behind. The caverns of the mind are obscure and shadowy; or pervaded with a lustre, beautifully bright indeed, but shining not beyond their portals.[30]

Darkness, silence and depth, that which is below and behind, extend as an unseen and unknown labyrinth below. The fissures, cracks and caves on the surface are entrances to the underground, imagined as entrances to the underworld. It is an enduring metaphor. Psychologist, James Hillman, reminds us that, from a psychological perspective, depth is the essential direction, quality and dimension of the psyche, that it is the only dimension that can penetrate to what is hidden, a thought which gives an interesting addition to the meaning of 'understand.'[31] Hillman adds that Hades, the god of the underworld and often the name for it as well, is interpreted as the 'hidden one,' the invisible god. He translates the line from Heraclitus, 'Nature loves to hide,' as a way of perceiving the mythic and psychic significance of Hades, who inhabits the 'hidden recesses of nature' (Hillman, p. 28). For Hillman, myth still lives in conceptual systems, particularly the subconscious, and the metaphorical substructure for this is 'the archetypal realm of the underworld' (Hillman, p. 23).

---

[29] William Wordsworth, *The Prelude: 1799, 1805, 1850*, ed. by Jonathan Wordsworth, M.H. Abrams and Stephen Gill (New York: Norton, 1979).
[30] Percy Bysshe Shelley, *Essays: Letters from Abroad, Translations and Fragments,* 2 vols, ed. by Mary Shelley (London: Edward Moxon, 1840), I, p. 246.
[31] James Hillman, *The Dream and the Underworld* (New York: Harper, 1979), p. 26.

The instability of the underworld, or subconscious is highlighted in the epigraph to Sigmund Freud's *The Interpretation of Dreams*, is a line from Book VII of Virgil's *The Aeneid*, where the enraged goddess, Juno, aims to stop the progress of the hero, Aeneas, 'If I cannot sway the heavens, I'll awake the powers of hell!' (VII. 365)[32] That which is below may be hidden and unattainable, though it will still make its presence felt: for Virgil it is the eruption of the destructive fury, Allecto, for Freud; it is the rising of suppressed memory into consciousness.[33]

Yulia Ustinova, describes how the neurological processes of the human brain can produce sensations of breathlessness, weightlessness, blurred or diminished vision, the hearing of unfamiliar sounds and disorientation when descending into a dark, labyrinthine cave. With this near hallucinatory tunnel vision, the descender could experience something akin to another reality, like being channelled through a vortex. Due to this type of experience, Ustinova argues that the ancient Greeks identified natural caves as entrances into the underworld, 'spiritual experiences were accorded topographic reality.'[34] The impact of these classical descent narratives on European literature is considerable, and the poems shaped by them came to wider attention during the long eighteenth century through translations. What follows is a survey of those in circulation in the eighteenth century, through either translations or new editions.

The anonymous tenth-century Anglo-Saxon epic poem, *Beowulf,* which was identified and transcribed after being saved from a fire in the library of the late antiquarian, Robert Cotton, in 1731, is a significant addition to the corpus of descent narratives. In this narrative, the eponymous hero dives down through the hellish mere in pursuit of the beast, Grendel's mother.[35] The flooded cave passage leads to their underworld lair: there is no Charon to help

[32] *Virgil: The Aeneid,* trans. by Robert Fagles (London: Penguin, 2007).
[33] Sigmund Freud, *The Interpretation of Dreams,* trans. by James Strachey (London: Allen and Unwin, 1954), p. 608.
[34] Yulia Ustinova *Caves and the Ancient Greek Mind: Descending Underground in Search for the Ultimate Truth* (Oxford: Oxford University Press, 2009), p. 31.
[35] *Beowulf,* ed. by C.L. Wrenn and W. F. Bolton (Exeter: University of Exeter Press, 1988), p. 153.

him traverse the water; Beowulf must swim down through it. As with the classical descent narratives, the water must be crossed if the underworld beyond is to be fully entered. This is a crossing of a threshold, a liminal experience, like no other. The poet presents this as a journey into the unknown referring to the mere sump and cave as 'eard git ne const' (1377) or, in a word for word translation, 'earth yet not known.'[36] Of all the descent narratives that appear in the eighteenth century, this one was probably the least known, and yet it incorporates the most embodied experience of a cave, and probably the first instance of a cave-dive in literature. The narrator places the mere entrance to the underworld in a pathless mountain wilderness, inhabited by wolves and other monstrous beasts, that is also hazardous to cross. The mere is inhabited by beasts that hang from the cliff sides and lurk beneath the surface of the water. Beowulf dives through the sump and, with no Sibyl to guide him or Charon to ensure safe passage, he grapples with the claws of the hellish beasts in the watery darkness and, in a fine piece of observational detail, disturbs the fine silt on the floor of the sump with his helmet before surfacing in the open cave deep underground. There exists in this narrative one formidable threshold after another to reach the hidden recess or cave. Like Christ's harrowing of hell, Beowulf, having already killed Grendal, kills Grendal's mother and cleanses the underworld. Imaginary though Grendal's mere is, the writer surely had some knowledge of the underground to describe it as he or she does. John Hutton in 1780, refers to the deep pothole of Meregill on the slopes of Ingleborough, which is coincidently like the description of Grendal's mere.[37] It has steep vegetated cliffs around a lake, and a strong and bold person could climb down to the lake edge. In very dry conditions the lake can dry up, and when it does, it reveals a passage into a large cave system beyond. Under normal wet conditions, this must be dived through to access the cave. The narrative provides evidence of

[36] J. R. Clark Hall, *A Concise Anglo-Saxon Dictionary* (Toronto: University of Toronto Press, 1894; repr. 1960).
[37] John Hutton, *A Tour to the Caves, in the Environs of Ingleborough and Settle* (London: Richardson and Urquhart, 1780; repr. Wakefield: S. R. Publishers, 1970), p. 33.

attention to topographical detail: an imaginative place drawn from observations of natural phenomena. The description of Grendel's mere is almost an exact replica of the monstrous and astonishing mere at the mouth of hell in the slightly earlier Anglo-Saxon Christian text, 'The Blickling Homily XVII'.[38] This too imagines the threshold to the underworld as a deep, devil-inhabited sump in a mountain wilderness, an underworld drawn from observing the underground.

Dante's *The Divine Comedy*, had its underworld book, *The Inferno*, translated three times in the eighteenth century, by Jonathan Richardson in 1719, who translated the passage relating to Dante's discovery of Count Ugolino;[39] Charles Rogers in 1782[40] and Henry Boyd in 1784 with the first complete translation by Henry Cary in 1812. This had been perceived as a difficult and overtly Catholic text prior to the eighteenth century, though Dante's descent into hell with the poet Virgil drew fascinating parallels with the journey of the latter's hero, Aeneas. The Christian descent narrative that leads down through the distinct multi-layered geography of hell prior to Dante would possibly be 'The Vision of St Paul,' in *The Apocryphal New Testament*.[41] Though an imaginary descent, the various levels of Dante's underworld mirror the typical topography of underground cave systems developed along many horizontal horizons.

Along with Dryden's translation of Virgil's *The Aeneid*, the most influential descent narrative for the long eighteenth century, was John Milton's *Paradise Lost*.[42] Milton had to re-position his underworld, hell, away from the earth. When the Satan and his fallen angels enter

[38] *The Blickling Homilies,* ed. by R. Morris (Oxford: Early English Text Society, University of Oxford Press, 1967), p. 208.
[39] Jonathan Richardson, *A Discourse on the Dignity, Certainty, Pleasure and Advantage of the Science of a Connoisseur* (London: Churchill, 1719), p. 30.
[40] Charles Rogers, *The Inferno of Dante* (London: Nichols, 1782).
[41] 'The Apocalypse of Paul (Visio Pauli)' in *The Apocryphal New Testament: A Collection of Apocryphal Christian Literature in an English Translation,* trans. by J. K. Elliott (Oxford: Oxford University Press, 1993), pp. 616 – 644.
[42] John Milton, *Paradise Lost,* ed. by Scott Elledge (Norton, New York, 1993).

hell the concept of Earth was but a rumour; Satan's descent is, therefore, more 'off-world' than underworld. First impressions of Milton's presentation of hell in *Paradise Lost* do not suggest a cave or any underground location; it appears to be in interstellar space, nine days 'fall' from heaven, 'in a place of utter darkness, fitliest called Chaos.' (I. Argument) He coins the phrase, 'darkness visible' (I. 64), and compounds it with, 'here their prison ordained / In utter darkness' (I. 72), 'the wide womb of uncreated night' (II. 150), 'this deep world / Of darkness' (II. 262). Milton marks the dimension of space, its depth and immeasurability: 'into the great deep' (I. Argument), 'the deep tract of hell' (I. 28), 'down to bottomless perdition' (I. 47), 'into what pit thou seest / From what highth fall'n' (I. 91), 'the vast and boundless deep' (I. 177), 'this vast recess' (II. 254), 'the hollow abyss' (II. 518), and their nine-day fall described to Adam and Eve by the angel Raphael, in all its dizzying disorientation is not unlike the neurological effects Ustinova describes.

These dimensions are not all immeasurable, there are boundaries; initially, after their fall, Raphael tells how hell 'yawning received them whole, and on them closed' (VI. 874). The abyss or gulf does have a ceiling: 'hovering on wing under the cope of hell' (I. 345); the fallen angels shout tears 'hell's concave' (I. 542). Satan does say that they are in a 'convex of fire' (II. 434) that prevents any escape though when he reaches the gates of hell, made of metal and rock, he abuts against 'the horrid roof' (II. 644). There appears to be one exit only: 'obstruct the mouth of hell / For ever and seal up his ravenous jaws' (X. 636). Here the entrance to hell, outer space underworld, is one of western culture's key thresholds, the cave entrance as the border of the 'tremendous mystery,' the dark and the feared unknown.

Milton's representations of 'underground' space provide us with a fascinating location; is it an empty shell or pod, or better still, a globe-like geode floating in interstellar space? This appears to be the case when Satan launches spectacularly into the wild abyss from the brink of hell (II. 917) he enters 'a dark / Illimitable ocean without bound / Without

dimension, where length, breadth, and heighth, / And time and place are lost' (II. 891). He must cross this wild space to reach the 'new world' – Earth (I. 650). Unlike other spaces, this space is infinite and beyond measure. This journey and traverse out of Hell and across chaos may not be all 'underground' though it must amount to one of the greatest, most daunting and awe-inspiring odysseys in literature.

Milton embeds classical references to the underworld in his poem: 'Stygian flood' (I. 239), 'Stygian throng' (X. 453), 'Plutonian hall' (X. 443), 'Cerberean mouths' (II. 655), 'gloom of Tartarus' (II. 858), 'the lowest bottom shook / Of Erebus' (II. 882). All five rivers of the classical underworld are present: Styx, Acheron, Cocytus, Phlegathon and Lethe (II. 575). As with Hesiod's 'bronze anvil' that takes nine days to fall from heaven to the bottom of Tartarus, Milton has his 'fallen angels' take nine days to complete the fall.[43] As with Tartarus and other underworld locations, Milton's hell is a place of punishment, a prison with seemingly no escape. As with the Sibyl's declaration to Aeneas at the entrance to Hades, Satan tells his fellow prisoners 'long is the way / And hard, that out of hell leads up to light' (II. 432). Here Milton clearly allies his poem with those of the classical authors, particularly Virgil, while at the same time generating a location that mirrors the enlightening psychological and geographical explorations of his age.

Lucretius, a poet who influenced Virgil, was also the subject of a major translation, that of Thomas Creech, who translated his epic poem, *The Nature of Things*, in 1682.[44] A very popular translation, it was published in many editions in the eighteenth century. Lucretius urged readers not to be superstitious and believe in the underworld, as it was largely a poetic creation of Homer. It was far better to observe nature's laws directly:

[43] *Hesiod: Theogony* and *Work and Days,* trans. by D. Wender (Penguin, London, 1973), p. 46.
[44] *Titus Lucretius Carus: Of the Nature of Things*, trans. by Thomas Creech (London: J. Matthews, 1714).

> To make Things plain and to instruct your Mind,
>
> And teach her to direct her curious Eye
>
> Into coy Nature's greatest Privacy. (I. 174 – 6)

'Nature's privacy' has also been translated as the 'recesses of things,' a phrase with the adjective 'hidden' that occurs in numerous texts throughout the long eighteenth century. The recess, for Lucretius, is the underground, the void in the rocks of the earth: 'For Drops distil, and subtile Moisture creeps / Thro' hardest Rocks, and ev'ry Marble weeps' (l. 402 – 405). The 'Marble' is limestone, and the power of water runs through the caves, 'pores,' of solid rock. Lucretius made this distinction between the underworld and the underground a generation before Virgil. Thomas Creech's translation was revered by other classical scholars as equal with Dryden's Virgil, the two of which, along with Milton's *Paradise Lost*, mark the beginning of the transformation of our understanding, perception and experience of the subterranean world of caves through the long eighteenth century, where it is a material reality and at the same time a state of the imagination. Entering and descending a cave is to cross a threshold, to embark on a transformative journey.

These archetypal descent narratives drawn from classical, medieval and restoration cultures provided the framework that enabled the shaping of a more openly self-conscious form of descent narrative in the eighteenth century. These descent narratives reflected the increasing interest in the role of the subconscious in an individual's identity, as well as the interest in the subterranean structure of the earth. What is also evident from these descent narratives is the author's attention to topographical detail. These imagined subterranean locations are products of Lucretius's encouragement to direct the 'curious Eye / Into coy Nature's greatest Privacy' and are all the richer for it. Beowulf's dive through the mere is palpable and gripping and Wordsworth's source of the creative imagination, 'the blind cavern,' is, paradoxically, transparent and unmistakeable.

Though the descent narrative is evident in much of the writing of the underground, it is more elliptical in the early writings of chemists and nascent geologists. O'Connor has shown that 'scientific writing was literature,' and the recurring metaphor of the eighteenth century, embedded in many scientific texts not directly addressing the underground, was the search into the 'hidden recesses of nature.' Though not a descent narrative it is a motif drawn from it. The noun 'recess' is a name given to a cave and the use of adjectives, such as 'hidden' and 'secret,' are commonly given to caves within the wider visible landscape. What is believed to lie hidden within these recesses is the knowledge and wisdom of the workings of nature; such knowledge that is only accessible to the bold, speculative and deeply curious natural philosopher. Ruston comments on this in relation to discovering the laws of nature, she quotes from Dryden's translation of Virgil's *Georgics* (II): 'Happy the Man, who studying Nature's Laws, / Thro' known Effects can trace the secret Cause' (Ruston, p. 12). As the underground is permanently dark with no sunlight or combustible energy source to provide natural light, it is a location reliant on illumination brought in with the human explorer. It is perhaps relevant to refer to the name later given to this period of rational and scientific inquiry: enlightenment.

Though the descent narrative is largely drawn from classical mythology, this enlightenment or search motif appears to be drawn more specifically from the Bible and it is evident that the origins of early scientific writings and theories of the earth were also the narratives of the Bible. The motif is found in many forms, for example: 'He revealeth the deep and secret things: he knoweth what is in the darkness, and the light dwelleth with him.' (Daniel, 2:22); 'He discovereth deep things out of darkness, and bringeth out to light.' (Job, 12: 22); 'And by knowledge shall the chambers be filled with all precious and pleasant riches.' (Proverbs, 24: 4). The essential metaphor is that of the biblical revelation or apocalypse: an uncovering or disclosure of what has been long hidden or concealed. This divine revelation is transferred to that of empirical and rational science. Adelene Buckland argues that though geologists of the nineteenth century created new forms to describe, display and explain their

findings to the public, such as maps, stratigraphic columns and museums, they also had to create new literary forms to 'bring into existence a science whose claims and insights were both complex and new.'[45] Natural philosophers had been doing this throughout the eighteenth century; this enlightenment motif was an old literary form transposed to a new context and conveyed the excitement and enormity of the search and discovery. Yet they were still searching in the 'dark.' Buckland adds that they had to use 'verbal descriptions, poetry and stories to attract public support for their often startling research and to give shape to their imaginings of a long-dead past for which they had only fragmentary evidence' (Buckland, p. 13). Buckland's point is crucial here, the evidence of the past was, at best, fragmentary: 'Geologists, coming into contact with ancient worlds, needed imagination to recreate a past neither they nor any human forebear could directly observe […] Literature had a vital role to play in shaping the literary conventions by which former worlds could be understood' (Buckland, p. 14). Fragmentary evidence and traces of an unobservable past presented as being initially 'hidden' and 'secret,' and perhaps even 'forbidden', could remain incomprehensible unless made coherent in a literary or historical narrative. The descent narrative and the enlightenment search motif are two attempts by literary science writers to construct a coherent view of their research and discoveries in deep geological time. The early geologists depended on the discoveries of antecedent sciences such as chemistry to make its most significant breakthroughs and as Jan Golinski argues: 'The new discoveries had placed unprecedented powers in the hands of the chemists and promised revelations of the inmost secrets of matter.'[46] It would be the chemistry of Joseph Black and the geology of James Hutton in the latter half of the eighteenth century that would reveal the 'hidden secrets of nature' and the way caves were formed.

[45] Adelene Buckland, *Novel Science: Fiction and the Invention of Nineteenth Century Geology* (Chicago: University of Chicago Press, 2013), p. 2.
[46] Jan Golinski, *Science as Public Culture: Chemistry and Enlightenment in Britain, 1760 – 1820* (Cambridge: Cambridge University Press, 1992), p. 236.

Subterranean Aesthetics.

In this section, the focus is on how the traveller appreciated the underground environment. Aesthetic perceptions of caves, as is evident from the tradition of the descent narrative, are seemingly inseparable from trepidation and fear. The absence of light is perhaps the most visibly obvious cause for trepidation, though darkness intensifies the fear of falling into a space without discernible dimensions. Fear of being lost in a labyrinth is also intensified by the darkness, as is drowning in water-filled passages with no surface to struggle towards. These find their basis in the primal fear of being buried alive, caught and sealed in stone darkness. In 1746, Jacques-Benigne Wilmslow translated and published a book originally written in French, *The Uncertainty of the Signs of Death*, and conveyed this fear as well, describing how those many had presumed to be dead 'have afterwards proved themselves alive by rising from their Shrouds, their Coffins, and even from their Graves.'[47] The book is made up of many examples, including suffocated miners brought out of mines after being left for dead, and people who wake up on the dissecting table.

The aesthetic considerations of the underground sublime in nature were evident in the seventeenth century through the French translation of Longinus's first century CE treatise on the sublime by Despreaux Boileau in 1674. Longinus's sublime was rhetorical; the aesthetic concept lay with the speaker or writer. The descender of caves may have experienced feelings of being overwhelmed though the aesthetic pleasure, or transport, came from their skill with language. Though independent theories emerged in the early eighteenth century, the earliest English translation of Longinus's treatise was by Leonard Welsted in 1724. Longinus writes of the rhetorical sublime in Chapter 1:

[47] Jacques-Benigne Wilmslow, *The Uncertainty of the Signs of Death, and the Danger of Precipitate Interments and Dissections Demonstrated* (London: Cooper, 1746), p. 1.

> The height and Excellency of Writing consists in the Sublime. […] The Sublime does not persuade, but creates Transport, always and everywhere superior to the Persuasive or the Elegant: as to the Persuasive, it has for the most part no more power over us than we please, but the Sublime comes upon the Hearer with an irresistible Strength and Force, and elevates him above himself.[48]

The passage shows us the power of language to overwhelm reason, or persuasion, and to affect the readers or listeners in a way they cannot control. He states further, 'the sublime, properly exerted, bears all before it like a Hurricane, and presents at one view, the Orator's whole collected Force.' The remainder of the treatise describes the structures, forms and styles necessary to write and express with sublimity.

It is evident that writers presenting natural philosophy as deduced through reason and empiricism would find this interpretation of the sublime problematic. Other writers began to develop the way the sublime originated and how it affected the reader or spectator, in part to avoid the accusation of tricking gullible readers or listeners. John Dennis in his discussion of the sublime in his *The Grounds of Criticism in Poetry* (1704) argued that Longinus was not clear about the nature of it. Dennis presented the sublime through the emotions of passion and enthusiasm:

> Fear then, or terror, is a disturbance of mind proceeding from an apprehension of an approaching evil, threatening destruction or very great trouble either to us or ours. And when the disturbance comes suddenly with surprise, let us call it terror; when gradually, fear. […] Thus, we have shown what objects of the mind are the causes of common terror, and the ideas of those objects are the causes of enthusiastic terror.[49]

---

[48] Leonard Welsted, *Epistles, Odes, etc. Written on Several Subjects with a Translation of Longinus's Treatise on the Sublime* (London: Walthoe, 1724), p. 143.
[49] *The Sublime: A Reader in British Eighteenth Century Aesthetic Theory* ed. by Andrew Ashfield and Peter de Bolla (Cambridge: Cambridge University Press, 1996), p. 36.

In 1712, in a series of articles for the Spectator that became known collectively as 'The Pleasures of the Imagination,' Joseph Addison moved the language and idea of the sublime into the senses, particularly the sense of sight. The readers may have had a vague outline in their imagination and may have seen images of them, though it was the style of the writer that conveyed the sublime. However, Addison was writing at a time when an increasing number and social range of people were travelling to remote and wild mountain regions, Addison himself had written a guide to Italy. He did not have to solely rely on the writings of others, he could see the mountains and caves for himself. The sublime was at this point chiefly concerned with language and the power of God; Addison shifted the attention to the natural object and the imagination of the observer:

> It is this sense which furnishes the imagination with ideas; so that by pleasures of the imagination, or fancy, I here mean such as arise from visible objects, either when we have them actually in our view, or when we call up their ideas into our minds by paintings, statues, descriptions, or any like occasion.[50]

Addison saw two kinds of sublime pleasure through the imagination; the primary pleasures are those of the natural objects the observer sees, while the secondary pleasures of the imagination are those we later conjure from the seen objects when we can no longer see them. Addison articulates the aesthetic aspect of Locke's key element of empiricism, that of sight and observation of the natural world. Natural philosophers were presenting a new way of perceiving nature; travellers were starting to find a growing market for their travel journals and poets were presenting a view of wild nature beyond that of the domesticated order and beauty of the aristocrat's garden. Amid this, the understanding of caves and all subterranean

[50] Joseph Addison, 'The Spectator', 411, June 21, 1712, in *The Works of Joseph Addison,* 6 vols, ed. by Henry G. Bohn (London: Bell, 1903), III, p. 394.

passages, and the combined descent narrative and its bewilderingly sublime character, began to create a unique geological form, at once a recognisable natural object and a state of mind.

For Edmund Burke, the sublime was a more subjective appreciation of the landscape than an objective one. It was not so much the cave that inspired feelings of the sublime, but our own imagination. Burke highlighted feelings of privation as a source of the sublime: vacuity, darkness, silence and solitude, and provides an example of Virgil's description of the entrance to the underworld in *The Aeneid*.[51] Burke argued that the fear of darkness was not simply a childhood memory of ghosts and goblins, it was more to do with safety as the subject is totally unaware of his or her environment: 'wisdom can only act by guess; the boldest are staggered, and he who would pray for nothing else towards his defence, is forced to pray for light' (Burke, p. 172). Burke's suggestion of the inadequacies of the singular strength of mind in such situations had already been articulated by Hume (1740) who challenged the coherence, the constant and invariable impression of self, or personal identity. He wrote:

> For my part, when I enter most intimately into what I call myself, I always stumble on some particular perception or other, of heat or cold, light or shade, love or hatred, pain or pleasure. I never can catch myself at any time without a perception, and never can observe anything but the perception. When my perceptions are removed for any time, as by sound sleep; so long as am I insensible of myself, and may truly be said not to exist.[52]

A partial negation of self appears as an effect of descending into the silence, solitude and darkness of a cave in the descent narratives of travellers and in the imagined descents of poets and novelists, to such a degree that the descent of a cave becomes a metaphor for depression

[51]Edmund Burke, *A Philosophical Enquiry into the Origin of our Ideas of the Sublime and the Beautiful and Other Pre-Revolutionary Writings,* ed. by David Wolmersley (London: Penguin, 1998), p. 113.
[52] David Hume, *A Treatise of Human Nature* ed. by David Norton and Mary Norton (Oxford: Oxford University Press, 2000), p. 165.

and mental illness. What Hume and Burke are addressing could be termed the 'uncanny.' Freud's description of the uncanny, in 1919, as 'what one calls everything that was meant to remain secret and hidden and has come into the open,' provides another reading of search into the 'hidden recesses of nature.'[53] Nicholas Royle offers a reading closer to Hume, for him the uncanny 'involves feelings of uncertainty, in particular regarding the reality of who one is and what is being experienced.'[54] For Royle, the uncanny is a strange, unaccountable merging of the familiar and the unfamiliar; it is a challenge to perceptions of nature. Royle adds, 'It is a crisis of the natural, touching upon everything that one might have thought was 'part of nature': one's own nature, human nature, the nature of reality and the world' (Royle, p. 1). The writings of poets and travellers conveys this disorienting and dislocating experience of descending underground.

The sublime invoked an emotion that took the observer by surprise and once the selected place had revealed its hidden recesses and become familiar, it was ready to be perceived and understood in a different dimension. Here another element of aesthetics potentially took hold, that of an increased understanding of what the observer was observing. It is in this kind of space that what is concealed reveals itself slowly, largely through instinctive curiosity and feelings of the sublime, to eventually become the object of systematic scientific enquiry. Philosopher Allen Carlson argues that 'knowledge and intelligence transform raw experience by making it determinant, harmonious and meaningful.'[55] The more cave explorers observed the relations between phenomena in a cave environment, the more appreciation they had of it. The sublime prepared the natural philosophers, travellers and writers for the enormity of geological time and space.

[53] Sigmund Freud, *The Uncanny* trans. by David McLintock (London; Penguin, 2003), p. 132.
[54] Nicholas Royle, *The Uncanny* (Manchester: Manchester University Press, 2003), p. 1.
[55] Allen Carlson, 'Appreciation and the Natural Environment' in *The Aesthetics of Natural Environments* ed. by Allen Carlson and Arnold Berleant (Plymouth: Broadview Press, 2004), p. 71.

The Space and Place of the Underground

Here, the focus is on the possibilities of identifying the nature of cave space and place. The natural underground is a strange, bewildering and extraordinary space to experience, and one that defies conventional definitions. General studies of geographical space rarely, if ever, consider it. It remains the overlooked, marginal space, or environment. Geographer, Yi-Fu Tuan, argues that space and place can be distinguished by space being what is open, remote, wild, inhospitable and unfamiliar while place is recognised as being secure, proximate, hospitable and familiar.[56] However, there is a difficulty in defining a cave as 'space' in the way deserts, mountain ranges and forests can be defined, in that a cave is a closed and concealed environment. Though the ultimate boundaries of the cave system may never fully be known, the immediate boundaries are solid, proximate and definite. Open spaces have horizons, caves have walls and darkness, and a darkness that has no diurnal cycles. We observe open spaces with a horizontal perspective, in a cave we tend towards a vertical perspective. Tuan addresses the essential ways we perceive and organise space and poses two observations, 'the posture and structure of the human body, and the relations (whether close or distant) between human beings' (Tuan, p. 34). Given the often-constricted dimensions and irregular angles of cave passages, these are interesting points of reference for our perception and organisation of cave space. The cave traveller's posture is rarely a simple upright one, and in many cave passages the perception of a companion may be by sound only. Tuan adds that space is organised through the conformity of the sides of the body: left - right, front – back, up – down. These, of course, persist in a cave though the shape and direction of the passage and the movement required to pass through it, can disorientate the traveller. Tuan concludes that unless these points are fixed to an external reference point they are useless in orientation, and in a cave, distant views are non-existent. An open wilderness has no trodden paths, yet a cave, however

[56] Yi-Fu Tuan, *Space and Place: The Perspective of Experience* (Minneapolis: University of Minnesota Press, 1977), p. 54.

remote, may offer a single passage, totally enclosed with no variations; though other caves are bewildering labyrinths formed on many levels, where worn paths merely confuse and further disorientate, and all are contemplated in near darkness. The light is usually attached to the helmet and illuminates only where the caver looks, peripheral vision is dim or non-existent. In these margins, dimensions vanish.

Tuan's perception of spatial ability and spatial knowledge shares elements with John Logan Allen's observations on exploration and the role of the imagination in anticipating the unknown. Tuan writes:

> The mind once on its exploratory path, creates large and complex spatial schemata that exceed by far what an individual can encompass through direct experience […] Spatial ability becomes spatial knowledge when movements and changes of location can be envisaged. (Tuan, p. 67)

Along with Allen's acknowledgement of the role of the imagination, here Tuan stresses the importance of movement, of tactual kinaesthetic patterns and experiences, in creating a 'mental world' that enables navigation and exploration. Given the complex and irregular structure of cave passages, and the physical contortions necessary to make head-way, such attributes are fundamental in navigating a passage through a cave, and as such, suggests Tuan's definition of space as a form of wilderness is apt for the cave environment.

However, it is evident that the 'show-caves' of the eighteenth century, such as Wookey Hole in Somerset, were not such wildernesses, and required no contortions to enter and pass through (as far as the show-cave went). Caves are too varied to be easily defined, and they are dynamic environments that undergo often catastrophic change from floods to collapse. The philosophers, Gilles Deleuze and Felix Guattari, propose a theory of space that could go some way to describing the dynamic complexity of cave space, that of 'smooth' and 'striated' space and the process of territorialisation. Smooth space permits movement without

any obstructions; it is open space, like a sea, desert or grassland steppe, which could be simultaneously a definition of wilderness as well as an open space familiar to nomadic cultures. Striated space restricts movement as it is designed, codified, pathed and tracked, as in-built space, which can be simultaneously inhabited and abandoned. Space is constantly undergoing change; it is a state of becoming rather than a state of being. This concept of territorialisation and re- and de-territorialisation is expressed by Deleuze and Guattari:

> No sooner do we note a simple opposition between the two kinds of space than we must indicate a much more complex difference by virtue of which the successive terms of the oppositions fail to coincide entirely. And no sooner have we done that than we must remind ourselves that the two spaces in fact exist only in mixture: smooth space is constantly being translated, transversed into striated space; striated space is constantly being reversed, returned to a smooth space. In the first case, one organizes even the desert; in the second, the desert gains and grows; and the two can happen simultaneously.[57]

When caves are discovered and explored they are surveyed; the first natural cave surveys were drawn in the eighteenth century. Caves are codified as striated space. Bolts or other fixed aids can be left in situ along with ropes, scaffolding and shoring to secure unstable areas. Pathways in cave sediments are soon formed. The natural restrictions of the space direct movement. However, as stated, the cave is constantly under the threat of transformation through water, sediment in-fill or collapse, some caves of enormous extent have been found, explored, surveyed and never visited again, and perhaps they never will. Caves can be wild and remote and take days, even weeks, to access. Travellers can be lost in even the most proximal cave systems. Though this theory of space enables us to see the unstable, dynamic

[57] Gilles Deleuze and Felix Guattari, *A Thousand Plateaus. Capitalism and Schizophrenia* trans. by Brian Massumi (London: Continuum, 2004), p. 524.

nature of the cave and our experience of it, there is an argument that it is not a space at all but a place.

The work of philosopher, Edward Casey, retrieves the importance of the notion of place and his perspective helps this thesis to find a way of defining the nature of the cave place. He argues that, 'Place is what takes place between body and landscape' (Casey, p. 29). Place is embodied, it is experienced through the senses, whereas space is not. This shifts the focus of Tuan's distinction between space and place, for Casey place too can be wild. He quotes poet Gary Snyder, 'Our relation to the natural world takes place in a place.'[58] Casey understands place as a product of a combination of phenomena, such as a cave, a landscape and a body. Though a place suggests a boundary, it is Casey's belief that these boundaries are porous, uncontainable. Tim Ingold defines this porosity differently, for him people do not exist in places, they exist between them through embodied movement. The term he has coined for this is 'wayfaring.'[59] This notion of movement and porous boundaries is a suitable way to define the nature of a cave from the perspective of the cave traveller.

In Casey's discussion of wild places, he draws on the tie that John Ruskin, in *The Seven Lamps of Architecture*, sees between displacement and desolation.[60] Ruskin's imagined displacement of the beauty he sees in the familiar Jura Mountains to the wilderness of the New World, generates a sense of desolation; this desolation, Casey argues 'signifies not merely an effect within a dissociated psyche but something common to psyche and to wilderness alike' (Casey, p.194). For Casey, the association between these words begins to create a sense of what wilderness can be: 'The desolating action of displacement consists in an exterocentric movement from a real or imagined place of familiarity into unknown

[58] Gary Snyder, 'The place, the region and the commons' in *The Practice of the Wild: Essays* (Emeryville: Shoemaker Hoard, 1990), p. 42.
[59] Tim Ingold *Being Alive: Essays on Movement, Knowledge and Description* (London: Routledge, 2011), p. 148.
[60] John Ruskin, *Selected Writings* ed. by Kenneth Clarke (London: Penguin, 1982), p.96.

marginal areas where desolation is prone to be found and experienced' (Casey, p. 194). Displacement is an appropriate way of describing a cave system. A cave is simultaneously an experienced place and a transposition into a marginal, alien and desolate place. The sense of desolation comes from the loss of a familiar centre, a cave rarely offers the reassurance of such familiarity, though eighteenth-century writers do imagine hermits living in caves. Desolation is experienced further in the way the place appears. Casey presents four characteristic forms of this desolate dis-place: barrenness, vastness, impenetrability and isolation (Casey, p. 195). These characteristics are applicable to a cave system and in Casey's exploration of wild places, though not applied by him to cave systems, he presents a vocabulary that enables an expression of subterranean places. This vocabulary does overlap with that offered by the concept of the sublime in eighteenth-century aesthetics, and the sense of displacement is exactly what appears in classical descent narratives when the hero departs from the surface world to the underworld.

The eighteenth-century travellers and natural philosophers perceived the underground to be an alien space that became an experienced, embodied place as they entered and passed through it, though still a wild place that, even after attempts to measure it, still appeared beyond dimensions. It was at once a place and a displacement, a place and a passage, a location and a dislocation. It was simultaneously observable and knowable and yet beyond observation and knowledge. Parts of the cave held great beauty, though the context was that of desolation. These theories of space come close to representing an understanding of the space of the cave, and provide a foundation from which to assess the other influences on the cave travellers of the long eighteenth century.

Travel, Curiosity and the Descent Narrative.

The development of travel and tourism in the eighteenth century led to a type of traveller who often suffered difficulty, danger and discomfort on their tours, possibly as a way of

distinguishing themselves from the more tame and organised tours of the 'tourist.'[61] Robin Jarvis argues that many did this as an act of 'deliberate social non-conformism.'[62] Many of the travellers that visited caves on their tours were members of the lower clergy who according to Jarvis, were 'free thinking undergraduates not yet incorporated into professional value systems and economic subservience' (Jarvis, p. 7). An opportunity to travel brought about the possibility of change, of transformation. Travellers took with them a sense of autonomy and independence, perhaps lacking at home or their place of work. Though far from being academic natural philosophers, these young independent travellers were interested in rational enquiry, natural history and exploration of unknown or remote wild nature, and, importantly, they were also interested in writing down their travel adventures and discoveries in published journals, whether formal or not. These early journals presented the journey through the progressive ordering of experience and foregrounded the subjectivity of travellers, of how they were shaped by the experience of travel. Geographer Eric Leed argues that travel and movement generate an experimental form of writing:

> Motion resolves all orders of space – topographies, positions, scenes, containments, places – into an experimental order of continuously evolving appearances, an evolution with its own peculiar laws.[63]

As with travel on the surface, cave travel, with its attendant sensory deprivation and intensification in an unfamiliar environment, necessitates an experimental form of writing. The writing cave travellers produced was, like all travel writing, of a hybrid nature that included narratives of adventures, philosophy, history, archaeology, natural history, poetry, classical literature as well as discourses on agriculture, industry and architecture. One genre

[61] Carl Thompson, *The Suffering Traveller and the Romantic Imagination* (Oxford; Oxford University Press, 2007), p. 31.
[62] Robin Jarvis, *Romantic Writing and Pedestrian Travel* (London; Macmillan, 1997), p. 27.
[63] Eric Leed, *The Mind of the Traveller: From Gilgamesh to Global Tourism* (New York; Basic Books, 1991), p. 73.

above all shaped the travel journal of the eighteenth century and that was the classical epic of the journey, or 'odyssey,' and embedded within these epics is the essential katabasis, the descent narrative. Many of the travel journals are about voyages of discovery around the country and include, almost as a duty to verisimilitude, a katabatic experience in a cave.

Accounts of descents necessarily varied depending on the intentions of the descender, for example, where they saw themselves on the scale between natural philosopher and traveller. The accounts could be closer to reports or to narratives; in many situations taking measurements in a cave is impossible and dimensions can only be guessed at. The subsequent disorientation of the observer imposes itself in narrative form in the report. While the travel writer deploys the descent narrative explicitly, the natural philosopher includes it implicitly. There existed a tension between the objective and subjective account of the underground experience. To travel underground to collect cave and karst data, the natural philosopher had to pass through and experience the space. Geologist and philosopher, Robert Frodeman, perceives both the difficulty and the advantage of this experience: 'Geologic seeing is poetic vision constrained by the sobriety of science, a series of daring imaginative leaps disciplined by examination and measurement.'[64] Frodeman stresses the relationship between science, experience and imagination: 'Geology is a type of walking meditation, a disciplining of the soul through the training of the eyes and body […] Walking the Earth and thinking in terms of deep time profoundly affects the way one experiences the world' (Frodeman, p. 115). For Frodeman, the traveller's imagination and curiosity are just as important as their knowledge and reason.

In 1780, John Hutton in *A Tour to the Caves*, the first book devoted entirely to cave exploration, states that it is written for the 'curious and speculative traveller.' To descend

[64] Robert Frodeman, *Geo-Logic: Breaking Ground between Philosophy and the Earth Sciences* (New York: State University of New York Press, 2003), p. 115.

underground and return requires a degree of curiosity. What drives this curiosity is a desire to perceive and experience what is unknown. The meaning of the word 'curiosity' in the eighteenth century was far from stable and was not universally understood as the prime motivation behind the rational and empirical study of natural history; for many it was more aptly associated with novelty and momentary wonder. Nigel Leask argues that the term appears with 'almost mechanical regularity' in the travel writing of the eighteenth century, and continued to do so after it ceased to appear in scientific contexts.[65]

For the classically educated traveller, it was Aristotle, in the opening lines of *The Metaphysics*, perhaps the most influential work of western philosophy, who identified our desire to know, 'By nature, all men long to know. An indication is their delight in the senses. For these, quite apart from their utility, are intrinsically delightful, and that through the sees more than the others.'[66] It is evident that this observation was developed by John Locke. The meaning of the word 'curious' had always included a condemnatory connotation that suggested one's desire to know or uncover something was too inquisitive, that one was prying into something that one had no right to know.

This form of curiosity gave energy and motivation to those wishing to descend underground, and, though the classical underworld was accepted as a pagan myth and the notion of an earthly underground hell had long since been dismissed, caves still held a dark and forbidding fascination in the popular imagination. Herein lies the use of curiosity as a fleeting desire for the peculiar, the uncanny, for wonder and surprise. Samuel Johnson acknowledged this when discussing the meaning of curiosity in *The Rambler,* No. 103 (1751), people, he argued, 'are allured by novelty of every kind, by a desert or a palace, a cataract or a cavern; we do not see a thicket but with some temptation to enter it.' He agreed with Homer

[65] Nigel Leask, *Curiosity and the Aesthetics of Travel Writing 1770 – 1840* (Oxford: Oxford University Press, 2002), p. 5.
[66] Aristotle, *The Metaphysics* trans. by Hugh Lawson-Tancred (London; Penguin, 2004), p. 4.

when he added that 'there is no snare more dangerous to busy and excursive minds, than the cobwebs of petty inquisitiveness.'[67] This meaning was exacerbated through the growth of tourism and travel writing as more people experienced travel to distant and unfamiliar places, returning with stories and objects taken out of context. These displaced objects, fragments and representations presented strangeness and wonder though not necessarily methodical and systematic knowledge. This was also the view of Henry Home, Lord Kames, who argued that curiosity was marked out by a shortness of duration, that it was momentary. Odd, rare and singular objects, he argued, generated the emotion of wonder and as the objects remained a novelty they could not provide us with worthwhile knowledge: 'Did the objects continue to affect us as deeply as at first, the mind would be totally ingrossed with them, and have no room left either for action or reflection.'[68] It is evident in the writing that travellers were engrossed and did reflect and form ideas that transformed the understanding of caves.

David Hume compared curiosity with the love of truth; he wrote, 'The first and most considerable circumstance requisite to render truth agreeable, is the genius and capacity, which is employed in its invention and discovery' (Hume, p. 287). For Hume, what was easy and obvious had little value, a person must struggle and stretch their thought and judgment in pursuit of truth. Johnson also saw curiosity as 'one of the permanent and certain characteristics of a vigorous intellect. Every advance in knowledge opens new prospects, and produces new incitements to further progress' (Johnson, p. 287). For Johnson, the key to curiosity is what you did with it, how far you took it and for what ends; however, he also acknowledged that 'we are continually at the same distance from the completion of our schemes' (Johnson, p. 287). For Johnson, knowledge may begin with curiosity but, for it to improve the mind, it must be pursued with labour and seriousness.

[67] Samuel Johnson, 'The Rambler, 4 vols.' In *Moore's British Classics containing Dr. Johnson's Rambler and Lord Littleton's Persian Letters*, ed. by James Moore (Dublin: Moore, 1793), p. 231.
[68] Henry Home, Lord Kames *Elements of Criticism*, 2 vols (New York: Georg Olms Verlag Hildesheim, 1970), I, p. 336.

Yet, all the writers from Aristotle to Kames, who seemingly condemn the notion of vulgar curiosity, also stress that it is essentially human, that we cannot resist it and that it is the basis for knowledge. To distinguish themselves from mere tourists, the traveller firstly wrote a journal and secondly identified themselves as being more than simply curious. These writers were following the example set by geologists, such as James Hutton, who insisted it was the duty of the curious and speculative traveller to explore the rules of nature, the natural and recurring processes, and not only the catastrophic exceptions. What was required was repeated observation with annotation and measurement, as a single observation could not reveal the truth. What were perceived as curious, though passive observations needed to be more dynamic and assertive. Reason, empiricism and aesthetics were all called upon to make to observer of nature see better.

Cave Representations.

Caves have been, and continue to be, of marginal interest to most people. They are out of sight, dark, largely dead and inert environments, difficult and dangerous to access and tightly enclosed. They have never appealed in the same way as mountains, for example, or the oceans. Yet, they have remained in the imagination of many as the uncanny underworld of an after or other-life. They may be marginal but they are always close, if only in the mind. Caves, if seen and experienced, restrict views; they exist as closed space and space that tilts alarmingly from the horizontal to the vertical, and in the darkness dimensions are lost. They dynamically exist in geological time and are essential in the interactions between the atmosphere, biosphere, hydrosphere and lithosphere, though these subterranean gaps in the lithosphere remain for many unseen, and hidden. In the long eighteenth century, our attitudes, perceptions and representations of the underground went through change and helped to establish the science of geology and form the basis for the Romantic imagination.

To conclude this introduction of such a wide range of interdisciplinary ideas and readings it will be useful to consider the work of Doreen Massey on definitions of the representation of space, and to apply them to cave space. Massey puts forward three propositions in the definition of space. The first proposition concerns how space is defined by interrelations. In the context of this thesis, the interrelations are between the physical and imaginative properties and perceptions of the underworld and the underground, the science and poetry. The second proposition is the representation of space through the coexistence of distinct and multiple trajectories of narrative and thought. The thesis explores many distinct, and previously overlooked, trajectories of cave narratives and thoughts. The third proposition is that space is always under construction, always under the process of being made, and this applies clearly to the way caves were represented in the long eighteenth century. Massey writes that space is 'the simultaneity of stories-so-far.'[69] Massey's propositions on space, applied to the cave, work alongside O'Connor's and Buckland's research into scientific literature and literary science and the 'confluence of disparate genres' (O'Connor, p. 23) that, by the nineteenth century, merge into the science of geology and its nascent branch of cave science. My thesis is a study of an extraordinary transformation in the way limestone caves were seen, imagined and understood throughout this period of history, and of the stories told of them, both literary and scientific.

[69] Doreen Massey, *For Space* (London: Sage, 2005), p. 9.

Chapter One: Establishing Cave Science

Introduction: Natural Philosophy and Literary Science.

In this chapter, I address the ideas of cave morphology from the turn of the seventeenth century found in the theories of the earth drawn from the biblical story of the flood, up to the discovery of limestone solution and its application to caves at the turn of the nineteenth century. These theories generated debates and competing theories: 'Neptunism' with geomorphology based on the action of water, 'Plutonism' with it based on heat within the earth, 'catastrophism' with it based on major transformative events, 'gradualism' with it based on repetitive processes. It was, however, unlikely that any natural philosophers tied themselves to a single theory; it is evident that the earth's formation is due to a combination of all of them. Limestone caves are crucial elements in the debate of the earth's formation, as they are the conduits, or drains, of the main erosive element of water. Time and duration too is crucial to the debate, either the historical time of the catastrophists or the deep geological time of the gradualists. Changes come about through the increased exposure of the caves through the rise of tourism and independent travel, the developing identity of the geologist and cave explorer and the application of chemistry experiments in the laboratory to the limestone of the caves. This gradual and partial understanding of limestone dissolution is the single most important discovery in cave science. It transforms perceptions of caves and, more widely, the corrosive and erosive processes that form the surface of the earth. In so doing, it is one of the key elements in the identification of geology as a separate branch of natural philosophy.

In 1830, when discussing the recent history of geology and the role of the Bible in understanding the formation of the earth, Charles Lyell wrote:

> It may be well to forewarn our readers, that in tracing the history of geology from the close of the seventeenth to the end of the eighteenth century, they must expect to be occupied with accounts of the retardation, as well as the advance of the science. […] A sketch of the progress of Geology is the history of a constant and violent struggle between new opinions and ancient doctrines, sanctioned by the implicit faith of many generations, and supposed to rest on scriptural authority.[1]

Lyell was old enough to have experienced some of this 'constant and violent struggle' between biblical theologians and scholars and natural philosophers that appears to have been responsible for the foundation of the earth science of geology, as it became known with the establishment of the Geological Society in 1807. In the period Lyell refers to, from around 1680, geology did not exist as an independent focus of study. The study of the earth was closely allied to the study of the Bible's first book of Genesis. Theories of the earth's initial formation were drawn from the basic description found in Genesis, as were the theories of the current form of the earth, which were drawn from descriptions of the earth after the 'Deluge' or 'Noah's Flood'. These were believed to have been written by the prophet, Moses with divine inspiration.[2] The study of earth processes was not a specialized subject and was embedded in the broader inquiry of natural philosophy. Perhaps more than the other elements of the philosophy, theories of earth processes were drawn from biblical scriptures. These natural philosophers interpreted the scriptures and studied other texts, pagan or heathen ones, to corroborate scriptural revelations. At the heart of this natural philosophy lay the foundations of a branch of geology, that of cave and karst science, though certainly not known as this or in any way isolated from the biblical whole. Caves were central to the theory as the flood waters necessary to cover mountains had to rise from reservoirs deep in the earth and to do so meant a tectonic force breaking through the surface, creating fissures for the

[1] Charles Lyell, *Principles of Geology* (London: Johnson Reprint Corporation, 1969), p. 30.
[2] Martin Rudwick, *Earth's Deep History* (Chicago: University of Chicago Press, 2014), p. 20.

water to emerge. These fissures then permitted the water to retreat beneath the surface. This singular catastrophe, it was argued, was responsible for the surface formation of the earth and the phenomena that made it possible were the caves and potholes found across the earth's surface and disappearing as drains deep beneath it. The history of cave geomorphology is, therefore, inextricably bound up with what Lyell refers to as the 'constant and violent struggle' between biblical orthodoxy and empirical observation and reason.

However, it is this biblical story that makes the 'retardation and advance of science' and the 'constant and violent struggle' problematic. Though there were marked differences in the latter part of the eighteenth century, what marks the differences early on is that the records show all the natural philosophers, who wrote about the earth's age and formation, stated in their work that they believed in the miraculous, biblical scriptures. The differences are those of textual interpretation. Rudwick's observation is that the early natural philosophers used the Bible to advance their understanding of the earth by transferring the 'messy unpredictable contingency' of human history, evident in the Bible, to that of nature (Rudwick, p. 5). The flood described through Noah's experience may have had some basis in geographic history. Recent research has uncovered evidence that the Black Sea region was subjected to catastrophic flooding around the time of 5,600 BC when the sea was a fresh water lake. What was then the narrow valley and channel of the Bosporus was overwhelmed by sea-level rise firstly in the Mediterranean Sea and then in the Sea of Marmara. Sediment samples suggest an area of 100,000km^2 was flooded in a few months. Natural philosophers drew on ancient texts other than the Bible. The geologists behind this research hypothesize that this was the flood described in Sumerian text, *Gilgamesh*, and that this could have evolved into the biblical flood of Noah.[3] This suggests that the flood was possibly more than a myth, and was drawn from sea-level change due to melting ice-caps. From the perspective of cave

[3] Angela Coe, Dan Bosence, Kevin Church, Steve Flint, John Howell and Chris Wilson, *The Sedimentary Record of Sea-Level Change* (Milton Keynes: Open University Press, 2002), p. 34.

science, either version is relevant in that the cave's existence is determined by the action of water. There is here an elementary recognition of a cave as a 'cascading system […] interconnected pathways of energy or matter, or both, together with such storage of energy and matter as may be required.'[4] The flood waters were perceived to have receded back into the 'great abyss' with much of the earth's surface washed in with it.

Lyell's 'struggle' only becomes evident in the literature of the latter half of the eighteenth century when greater quantities of fieldwork, empirical observations and rational deduction were producing anomalies that could not be assimilated by biblical scholarship. Lyell's *Principles of Geology* can be seen to be the culmination of this struggle and the founding text of the new science of geology. Though still an early text, *Principles of Geology* provides a degree of coherence and the coalescence necessary for geologists' fieldwork and observations. It provided a framework while being able to allow for and accommodate anomalies. In 1787, during the critical period that Lyell sees as a crisis, Kant saw a transformation in scientific and philosophical thinking, a 'Copernican Revolution' after the transformation of cosmology thought to be brought about by the sixteenth century work of Nicolaus Copernicus. At this point of transformation, Kant argues, natural philosophers are perceiving the problem from a dual point of view: the objects of study (in the case of Copernicus, stars) revolve around the spectator, while then the spectator, when in study, revolves around the objects. The object alone need not be the sole centre of thought, the way the mind becomes the still centre introduces the processes of rational deduction. This analogy with Copernicus' transformation of astronomy enables Kant to propose that an object (the subject of the senses) conforms to the nature of our faculty of intuition. It is through this that *a priori* knowledge, that of time, space and causes, is possible.[5] This pursuit of a rational, *a*

[4] Ian Fairchild and Andy Baker, *Speleothem Science: From Process to Past Environments* (Oxford: Wiley-Blackwell, 2012), p.13.
[5] Immanuel Kant, *Critique of Pure Reason* trans. by Paul Guyer and Allen Wood (Cambridge: Cambridge University Press, 1998), p. 110.

priori knowledge of causes challenges the miraculous causal power of God in relation to the biblical flood. It is the mobilisation of data brought about by fieldworkers which makes this dual vision, and confidence in the pursuit of *a priori* knowledge, possible. The analysis and synthesis of this mobile data reverses the balance of forces, and those which were once on the periphery of the biblical theories are brought to the centre to establish the new one.[6]

Caves and their morphology are included in Lyell's *Principles*, though they are marginal. He does acknowledge, however, the geo-chemical process of limestone solution and its role in cave morphology and this is a defining moment in cave science. Without knowledge of this process any understanding of cave geomorphology will be misconceived and incomplete.[7] Limestone solution was grasped though not fully understood at this point. The role of carbon dioxide in the atmosphere and its relationship with rain and allogenic streams was yet to be fully discovered. However, if caves and their interactions with the wider environment are considered then the gradual processes of change in the understanding of the underground in the eighteenth century is evident. It was this interconnection of the atmosphere and biosphere with the subterranean environment that started to bring about an understanding of cave morphology and establish cave science. The more that was understood about climate and life on the surface, the more was understood about what lay below. Such knowledge required the cooperation of chemists in laboratories and cave explorers who were interested in advances in chemistry. This was a transformation that took time and a range of experiments that initially had no connections with the morphology of caves. More caves had to be found and explored beyond the initially limited number of show caves; different forms of cave and the connections between them, a cave's hydrology, were crucial, as the rules and processes had to be understood beyond the impressive though limited exceptions. A

[6] Bruno Latour *Science in Action* (Cambridge, Massachusetts: Harvard University Press, 1987), p. 233.
[7] Trevor Shaw, *History of Cave Science. The Exploration and Study of Limestone Caves to 1900* (Sydney: Sydney Speleological Society, 1979; repr. 1992), p. 109.

recalibration of geological time was necessary to understand the rates of corrosion. Study of karst surfaces would enable a realization of what was happening out of sight below. It was also evident in this period that an understanding of the earth was a 'deep' process, where the inquirer had to cross established and orthodox thresholds to search 'hidden recesses.' The subterranean environment was not only an important location of scientific study, it was a central metaphor for the advancement of science.

Descent narratives rarely feature in this literature of nascent cave science though as O'Connor (2007) and Buckland (2013) argue, the writings of natural philosophers were perceived as literary as well as scientific. Narratives and motifs, drawn from classical and biblical sources, framed the theories and experiments. The theories and accounts of experiments that mark the gradual understanding of limestone solution and the corrosive and erosive power of water on rock are either too conjectural or too dependent on the laboratory to incorporate the katabatic journey. However, curiosity and revelation are essential features of this discourse. The 'pursuit' of knowledge that is either concealed or forbidden in the deep and dark 'hidden recesses of nature' is a recurring motif in the long eighteenth century. This motif is evident in the theories of Thomas Burnet, John Woodward through the experiments of Stephen Hales and David Macbride and up to the writings of Humphry Davy as late as 1802. In his *Discourse*, Davy writes of 'slowly endeavouring to lift the veil concealing the wonderful phenomena of living nature,' and that, not content with what is found on the surface of the earth, 'man has penetrated into her bosom'.[8] Davy exploits the metaphor of the earth's gender in his pursuit into the dark, hidden depths:

> And who would not be ambitious of becoming acquainted with the most profound secrets of nature, of ascertaining her hidden operations, and of exhibiting to men that

[8] Humphry Davy, *The Collected Works of Humphry Davy,* ed. by John Davy, 9 vols (London: Smith, Elder and Co., 1839), II, pp. 314 – 8.

> system of knowledge which relates so intimately to their own physical and moral constitution? (Davy, p. 320)

Davy's search motif is one of sexual conquest: the pursuit, discovery, rape and exhibition of the female earth. It is reminiscent of a tale of the Olympian gods and their sexual transgressions. It is interesting that Davy relates this violation to man's 'moral constitution.' In his disclosure of what has been long concealed, Davy mirrors Seneca's Hercules in that he is driven to bring nature's hidden secrets to light by breaking the boundaries of the underworld and the known world (*Hercules Insane*, III, 5).[9] As with Hercules' revelation, it is difficult to separate this motif from the descent narrative. Those natural philosophers who do venture into caves combine the two; for example, John Hutton repeatedly compares himself to Aeneas on his katabatic descents into caves and refers to the caves and their unknown ramifications as the 'hidden recesses of nature.'[10]

The German philosopher, Friedrich Schelling, who shared his ideas concerning nature and science with Coleridge[11] and the German geographer and explorer, Alexander Von Humboldt, argued that there was an organic unity connecting the 'subjective world of the Self and the objective world of nature.'[12] Such arguments give further evidence for the literary science discourse of the eighteenth century. Schelling, in the 1803 edition of his book on natural philosophy and the crucial role played by chemistry, concluded with a pair of metaphors comparable the one used by Davy:

> There now stands open to us, in the disclosures of organic Nature, that path into the true interior whereby we penetrate at last to the most perfect knowledge of the divine

[9] Seneca, *Phaedra and Other Plays* trans. by R. Scott Smith (London: Penguin, 2011), p.27.
[10] John Hutton, *A Tour to the Caves, in the Environs of Ingleborough and Settle* (London: Richardson and Urquhart, 1781), p. 45.
[11] Samuel Taylor Coleridge, *Biographia Literaria* (London: Dent, 1817: repr. 1947), p. 72.
[12] Andrea Wulf, *The Invention of Nature: The Adventures of Alexander von Humboldt, the Lost Hero of Science* (London: John Murray, 2016), p. 128.

> Nature, in *reason*, as the indifference wherein all things lie in equal weight and measure as one, and this veil in which the act of eternal producing is clothed, itself appears dissolved in the essence of absolute ideality.[13]

Schelling's explorer and natural philosopher 'penetrates' along the 'path into the interior' in search for what his concealed, or 'veiled', there. The search is again a gendered one with the presumably male explorer 'unveiling' feminine nature, or from a chemical perspective, 'dissolving' it. Though this search motif is used by a range of travellers, poets and natural philosophers, its use is particularly evident among chemists and those writing about it. The role played by chemistry in understanding air and water, as well as elements and minerals, is fundamental in the early nineteenth century specialisation of geology and its attendant science of caves. Joseph Black's relationship with James Hutton is important in this development of science and literature, as is Davy's relationship with Wordsworth and Coleridge. As Jan Golinski argues, 'The new discoveries had placed unprecedented powers in the hands of the chemists and promised revelations of the inmost secrets of matter' (Golinski, p. 236).

The Royal Society, Fieldworkers and the Concept of Nature.

From 1660, the newly formed Royal Society through its journal, *Philosophical Transactions*, began to encourage travellers, especially seamen, to observe, measure and record natural phenomena of all kinds on their travels, to gather and mobilise knowledge. In 1671 the editors stated their aim to 'know how the World was made, and the Operation of the Elements; the beginning, ending, and midst of Times.'[14] The editors of *Philosophical Transactions* knew this

[13] Friedrich Schelling*, Ideas for a Philosophy of Nature, as Introduction to the Study of this Science, 1797*, trans. by Errol Harris and Peter Heath (Cambridge: Cambridge University Press, 1988), p. 273.
[14] 'Preface to the Seventh Year of these Tracts,' *Philosophical Transactions* 6 (1671), p. 2088. <http://rstl.royalsocietypublishing.org/content/6/69/2087.full.pdf+html> [accessed 30 April 2018]

was a problem even then. Advances could not be made in natural philosophy without mobilised data from fieldwork:

> A Natural History of Countries is most wanting; which, if well drawn, would afford us copious view and a delightful prospect of the great variety of Soyls, Fountains, Rivers, Lakes … or of subterraneal Streams. […] And it were to be wished, that in all Mines and where ever deep Wells are digged, notice were taken, in what order the several kinds of Earth, Loam, Sand, Gravel, etc. do lye.[15]

Here, the study of caves is implied through reference to underground streams as well as excavated holes in the ground. Notable among those natural philosophers who did venture underground was John Woodward, who urged travellers to record detailed notes of the geological formations and their locations when searching for fossils in 'the Bowels, and deeper Parts of the Earth.'[16] It was Woodward who specifically directed travellers to the underground in search of the natural curiosities, such as fossils and speleothems. He was a theorist who engaged in a more dynamic and assertive form of observation: he routinely replicated his observations and recorded them. However much he tried to encourage people to descend below ground, those who accepted the challenge were few. The subterranean world was a journey too far.

Though few, some natural philosophers did descend underground and record their findings of the earth's formation, however, the biblical theory overshadowed these empirical observations. It was here that there existed a crisis at the heart of these theories, as Marjorie Nicolson argued: 'Almost alone among the sciences geology was retarded by Genesis, which taught not only the miraculous creation of the earth in time, but divine order in the creation

[15] 'The Preface,' *Philosophical Transactions of the Royal Society* 11 (1676), p. 552. <http://rstl.royalsocietypublishing.org/content/11/123/551.full.pdf+html> [accessed 30 April 2018]
[16] John Woodward, *Fossils of all Kinds, Digested into a Method Suitable to their Mutual Relation and Affinity* (London: Innys, 1728), p. 95.

of inorganic matter and organic species.'[17] Latour argues that in the work of natural philosophy, miracles are called upon when the framework or theory becomes detached from the elements that bind them together (Latour 1987: p. 242). The reliance on miracles was generating the crisis. At a time when empirical observation was uppermost in the practice of natural philosophy, earth theories kept faith with a book. This section considers the wide range of thinkers and ideas that made up the community of natural philosophers, largely based on membership of the Royal Society, or through correspondence with it. There was no singular stance taken. Even within the bounds of biblical orthodoxy there was disagreement.

Essential to the theories were the ideas of the origin of the earth, its transformation by way of the universal flood and its ultimate dissolution, with all these events generated by the miraculous power of God. God was the final cause, especially so when revealed through the scriptures. When John Woodward suggested that gravity was behind the retreat of the flood waters and the deposition of layers of sediment and fossils, many followed John Hutchinson and condemned him as 'God's undertaker' for removing God from the fundamental cause of the event and putting a force of nature in place.[18] This brought into focus the potentially limitless pursuit of cause and effect; how far back could the curious natural philosopher go in establishing a cause for a natural effect? Was it possible to acknowledge nature as the cause? For caves, the causes are important: God created the pressure for the waters to rise from the deep abyss; God created the conditions for the waters to retreat; God created the conduits to ensure both processes were possible. God's power generated the necessary erosion within the time-frame of a few days and God created the earth for human beings to inhabit 6,000 years ago. God, and divine providence, was the miraculous force that held the framework together, not nature (Rudwick, p. 76).

[17] Marjorie Hope Nicolson, *Mountain Gloom and Mountain Glory: The Development of the Aesthetics of the Infinite* (Seattle: University of Washington Press, 1959; repr. 1997), p. 146.
[18] John Hutchinson, *Moses' Principia* (London: Bettenham, 1724), p. 79.

Caves were not separated from the study of natural philosophy; they were a part of nature, and during this period an essential struggle took place over the discourse of nature, and the word, nature, itself. One of the most influential natural philosophers of the late seventeenth century was Robert Boyle, who pursued a rigorously empirical approach to study, believed in a Cartesian mechanical universe and who believed devoutly in the creative role of God in the formation of the earth and the universe and therefore particularly in Moses' account of it. Boyle was among the founders of the Royal Society and remained throughout his life a central figure within it. His huge scientific output, especially in chemistry, had a major impact on his peers and his research still has contemporary relevance. For this study, his most influential piece of writing was *A Free Enquiry into the Vulgarly Received Notion of Nature* (1686).[19] His premise was that the belief in the 'true and positive being of the human soul' led to a popular, or 'vulgar,' belief (a 'deluding propensity') that all other things also had a 'true and positive being' (Boyle, p. 9). This belief that nature was a 'notional entity' or a 'real or existent being' Boyle argued, led to confusion and 'a great deal of darkness' (Boyle, p. 32). This concept of nature was not supported by biblical revelation. Boyle appears to be challenging the revelatory search motif used by other philosophers: in God's absence no light can illuminate the hidden recesses of nature. These philosophers were in error with their 'imaginary being called nature' (Boyle, p. 62). Using the word 'nature' as the subject of a sentence when explaining an empirical observation did nothing to aid the reader: 'When a man tells me that "nature does such a thing," he does not really help me understand or to explicate how it is done' (Boyle, p. 34). Boyle explored the various meanings of the word 'nature' and offered alternatives such as 'essence' and 'established order,' though his main alternatives to 'nature' were 'God' and 'mechanism.' When he considered the use of the word as associated with pagan religion, such as 'earth mother or goddess,' he simply dismissed it as

[19] Robert Boyle, *A Free Enquiry into the Vulgarly Received Notion of Nature* ed. by Edward Davis and Michael Hunter (Cambridge University Press, Cambridge, 1996), p. 9.

ridiculous superstition and offered no substitute (Boyle, p. 24). He was not interested in the hidden, subterranean space providing the basis for such myths and associated representational spaces. For Boyle, the world was a 'great, pregnant automaton […] a compounded machine, in conjunction with the laws of motion freely established and still maintained by God' (Boyle, p. 40). Boyle was persuading natural philosophers and curious travellers to be precise in their observations and records, to consider in detail the minute workings of one thing upon another and not to lazily fall back on the 'workings of nature.' He was trying to produce a new vocabulary for the revolution in the ways of seeing 'nature:'

> On this occasion, I must not forbear to take notice that the unskilful use of terms of far less extent and importance, and also less ambiguous, than the word 'nature' is, has been and still is, no small impediment to the progress of sound philosophy. (Boyle, p. 153)

The primal cause of all phenomena was God, though humanity used observation and reason to find the causes of all effects and to locate agency working in the 'mechanism' of the natural world. The concept of nature in place of God will 'shake, if not subvert, the very foundations of all religion' (Boyle, p. 63). In the mid-eighteenth century, Boyle's chemistry, along with the physics of Isaac Newton, inspired the experiments of Stephen Hales and Joseph Black into 'fixed air' (carbon dioxide) and an understanding of limestone solution, a discovery that would challenge the orthodox literal readings of Genesis and the flood. Boyle concludes his *Enquiry* in a manner less assertive and triumphant than many of the philosophers that will follow him into the 'hidden recesses of nature': 'I have written this discourse rather like a doubting seeker of truth than a man confident that I have found it.' This sentence is followed by a Latin quotation from Seneca's *Natural Questions* (1. 25) with the translation: 'There will come a time when posterity will wonder that we were ignorant of things so manifest' (Boyle, p. 165).

It is a perspicuous statement to make at the start of serious empirical, rational and imaginative enquiries into the formation of the earth and its limestone caves.

In a letter to Robert Boyle in 1679, Isaac Newton wrote that 'what I am not satisfied in, I can scarce esteem fit to be communicated to others; especially in natural philosophy, where there is no end of fancying.'[20] Newton wanted natural philosophers to avoid 'fancy,' or the imagination. For him, the main thing was to avoid using any word for what was the unknown. In his *Principia,* Newton wrote that 'no more causes of natural things should be admitted than are both true and sufficient to explain their phenomena' (Newton, p. 107). When the cause of a process or phenomena is unknown, it should be left as unknown, as Newton writes concerning the cause of gravity (Newton, p. 113).

The debate surrounding primal causes, about the agency of God or nature, was evident across Europe through international correspondences with the Royal Society, and for the Dutch philosopher, Baruch Spinoza, such a stance was pointless as it encouraged people to believe in miracles, rather than use their reason. He argued, from a similar position to Locke, 'the common people imagine that the power and providence of God are most clearly evident when they see something happen contrary to the usual course of things and their habitual views about nature.'[21] Spinoza went on to argue that 'from miracles we cannot know about either the essence or the existence or the providence of God, but rather that all three are much better grasped from the fixed and unchangeable order of nature' (Spinoza, p. 82). Any power that conflicts with nature, Spinoza argued, would conflict with the primary principles we have concerning nature and God and, as such, would be absurd and would undermine all our perceptions. He argued further that, 'Nature has no end set before it, and

[20] Isaac Newton, *Philosophical Writings* ed. by Andrew Janiak (Cambridge: Cambridge University Press, 2014), p.15.
[21] Baruch Spinoza, *Theological-Political Treatise* trans. by Jonathan Israel and Michael Silverstone (Cambridge: Cambridge University Press, 2007), p. 81.

that all final causes are nothing but human fictions.'[22] Spinoza saw no difference between God and nature; for him it was a matter of 'God, or nature.' God did not transcend creation but was immanent within it (Spinoza, *Ethics*, p. 72). Karl Kroeber writes of Spinoza's concept: 'Spinoza's God-Nature, divine nature, is self-creating and self-created, acting according to the laws of its own being.'[23] This concept of nature as a 'being' clearly ran contrary to Boyle's argument and close to what he and the church theologians would identify as atheism, or at best deism.

For Boyle, God was the prime agent, particularly regarding the deluge and the forming of caves, and he was not alone in this belief. The epigraph in John Ray's *The Wisdom of God* (1704) is from the Psalm 104. 24: 'How manifold are thy works, O Lord! In wisdom hast thou made them all.'[24] He rejects the hypothesis of Descartes, which excludes all consideration of final causes, as rash and arrogant (Ray, p. 42). John Hutchinson, who damned Woodward for suggesting gravity was the prime agent of the retreating flood waters and not the power of God, went so far as to write a book about God as the final cause, using Woodward's title, though replacing 'Earth' with 'Bible.' He argues:

> God calls himself, Possessor of Heaven and Earth, which he is, by the Agents and Powers he has established and reveal'd, and by his immediate Power over them: If any one offers to set up or propagate any Notion of any other Agent or Powers; does he not in Imagination eject God's Agents, and their Powers, and Him, and put his imaginary Agents and Powers in Possession?[25]

[22] Baruch Spinoza, *Ethics* trans. by Edwin Curley (London: Penguin, 1996), p. 27.
[23] Karl Kroeber, *Ecological Literary Criticism. Romantic Imagining and the Biology of Mind* (New York: Columbia University Press, 1994), p.59.
[24] John Ray, *The Wisdom of God, Manifested in the Works of Creation* (London: Smith, 1704), p. 17.
[25] John Hutchinson, *An Essay towards a Natural History of the Bible* (London: Bettenham, 1725), p. 271.

Many natural philosophers opposed Spinoza's views though it is evident that many were reading them, however 'dangerous' they may have been. The secretary of the Royal Society, Henry Oldenburg, colleague of Locke, Boyle, Newton, Burnet, Ray, Woodward and Hutchinson, was a correspondent of Spinoza and wrote to him on 15th November 1675:

> I cannot but approve your intention of wishing to elucidate and render easier those things in the *Tractatus Theologico-Politicus* which have tormented readers. They are, especially, I think those passages which seem to speak ambiguously about God and Nature, which two, as you may judge, you have confused. Besides this, you may seem to many to detract from the authority and values of miracles, on which alone, as nearly all Christians are persuaded, the certainty of divine revelation can be based.[26]

Oldenburg was a great admirer of Spinoza and raises the concern of the 'reader' and 'nearly all Christians' rather than his own concern with the *Tractatus*. He makes repeated use of the auxiliary verb, 'may' to convey a degree of uncertainty. It is evident that, though controversial, the equivalence of God and nature is far from being rejected. It will be this equivalence along with the rejection of miracles as causes that will, in part, lead to the gradual transformation of the biblical theories.

Spinoza went further in his *Treatise*; he argued that the prophets, including Moses, received their revelation through their capricious and changeable imaginations and then relayed it to the masses by way of parables and allegories. Such scripture was not to be trusted (Spinoza, *Treatise*, p. 26). He argued that many would challenge his view but it was evident that the 'word of God' was 'erroneous, mutilated, corrupt and inconsistent, that we only have fragments of it, and that the original […] has perished' (Spinoza, p. 163). Theorists make a clear distinction between what beliefs, observations and hypotheses can be assimilated into the

[26] Henry Oldenburg, *The Correspondence of Henry Oldenburg* ed. and trans. by Rupert Hall and Marie Boas Hall, 13 vols (London: Taylor and Francis, 1986), XII, p. 56.

theories and what cannot. It is the philosophy of Spinoza that causes the greatest degree of concern; he is a philosopher on the periphery, one who embodies distrust in the orthodox biblical thinking. However, many of the texts that are written in the eighteenth century, especially by independent travellers who publish their journals to an increasingly wide audience, do challenge final causes and, whether included consciously or not, nature becomes a prime agent in the formation of caves. As Schelling's unity of nature and humanity came to influence writers at the turn of the nineteenth century, Spinoza's fusion of God and nature also came to affect natural philosophers and fieldworkers in a Pantheistic attraction to wonder of the natural world.[27]

Biblical Theories of Cave Morphology.

The Bible is vague about the origin of caves but it does provide a framework from within which their origin was imagined in the seventeenth century. The framework is the singular catastrophe of the flood described in Genesis when the rain began to fall waters also began to rise: 'the same day were all the fountains of the great deep broken up' (7:11). After 150 days, the fountains (springs) from the 'great deep' were stopped and the water either evaporated or returned down through the broken 'deep'. There is not much detail to work from. However, in 1724 natural philosopher John Hutchinson argued that this was the point behind the word of God, written through the prophet, Moses, as it was then believed. Hutchinson wrote:

> The Revelation of Moses of the Creation and Formation of Matter is very short; was not intended to relate any Thing or Circumstance to us, but what we could not perceive without it; and yet has not omitted any Thing we could not otherwise know. (Hutchinson, 1724, p. 1)

[27] Martin Rudwick, *The Great Devonian Controversy: The Shaping of Scientific Knowledge among Gentlemanly Specialists* (Chicago: University of Chicago Press, 1985), p. 40.

This essentially supports Boyle's argument: the prime cause is identified as God who has left all else for us to observe and understand. The first substantial attempt to interpret the scripture came from the natural philosopher, Thomas Burnet who, in 1690, presented a two-part English translation, from the initial Latin version of 1681, of his theory of the earth's formation and eventual dissolution based on his readings of the Bible: 'This whole Series and compass of things taken together, I call'd a Course of Nature, or a system of Natural Providence.'[28] His task was to 'discover the ways of Divine Providence.' Burnet was not interested in myth; he was an observer of nature. On a visit to the caves near Naples, he is told by the locals that the Averno Cave, 'where the Sybil is said to have given out her inspirations,' was hewn out of the rock by the Devil. The chisel marks on the rock tell him otherwise.[29] However, Burnet is also searching for revelation through nature. He states in the first sentence of his *Sacred Theory*:

> Since I was first inclin'd to the Contemplation of Nature, and took pleasure to trace out the Causes of Effects, and the dependence of one thing upon another in the visible Creation, I had always, methought, a particular curiosity to look back into the first Sources and ORIGINAL of Things; and to view in my mind, so far as I was able, the Beginning and Progress of a RISING WORLD. (Burnet, p. 23)

This is a bold statement of motivation and intent that would not go amiss in the later writings of Hutton or Lyell. His tracing of cause and effect and his 'particular curiosity' about the 'first Sources and Original of Things' was perceived by some orthodox Christian thinkers as searching too deeply into God's miraculous creation. Natural philosophers, such as Boyle and Hutchinson, stressed in their writing that God was the primal cause of all creation; to keep

[28] Thomas Burnet, *A Sacred Theory of the Earth* (London: Centaur, 1965), p. 23.
[29] Gilbert Burnet, *Bishop Burnet's Travels through France, Italy, Germany and Switzerland* (Edinburgh: Sands, Murray and Cochran, 1752), p.175.

propping into the unknown was to question this faith. Burnet addresses this point in his Introduction:

> The obscurity of these things, and their remoteness from common knowledge will be made an argument by some, why we should not undertake them. […] There is nothing so secret that shall not be brought to light, within the compass of our World. (Burnet, p. 25)

He sees his natural philosophy as a way to revelation. The obscure sources and causes of things leave a trace that can be followed, or pursued, into the secret and remote recesses of the earth. Burnet's book is the first attempt at a coherent account of the formation of the earth and it begins with a literary narrative of search and disclosure.

He was the first of several philosophers who presented their theories, all based on scripture yet all differing to some extent in accounting for the effects of the deluge. They became known as the 'theorists' and their work depended on another group of biblical scholars and natural philosophers who measured the age of the earth from the Bible and other ancient texts who were known as the 'chronologists.' In seventeenth-century Britain, the chronologist who carried the greatest influence was the historian, James Ussher, who estimated that the earth was formed in 4004 BC; which gives almost five and a half thousand years for Burnet's theoretical earth story to unfold (Rudwick, p. 11). Such a relatively short space of time, of human history, provides the framework for the biblical rendition of the formation of the earth. For the natural philosophers of the seventeenth century, the earth was formed as the habitat of humanity; its initial dissolution through the flood was allegedly witnessed by Noah, and so the earth's history coincided with human history. As is it is now understood, this period of history does not provide enough time for the processes of weathering, erosion (including chemical weathering, as found in limestone solution, and extensive glaciation), transport and deposition to take place, nor mountain building through

the process of plate tectonics. Burnet and his contemporaries had no way of knowing the age of rocks or the mechanisms required for mountain building. Though they observed volcanic activity and earthquakes and saw the changes to the surface that they made they could not know they were generated by plate tectonic activity. Subsequently, all evidence of erosion, such as landslides and that from rivers and seas, was immediate or relatively recent and simply indicated the decay of the already ruined earth that would continue between the devastation of the flood and its eventual demise by either fire or another flood at a time in the future known only to God. This is of crucial importance, as without the understanding of what is now known by geologists as 'deep time' and the numerous cyclical earth processes, a grasp of the earth's formation will be an unsolvable puzzle. If the earth existed in eternity, as suggested by Aristotle, then, Burnet argued, erosion would have worn all landforms down, there would be no mountains left standing, everything that is eroded is transported to the sea, 'and nothing is ever brought back again by any circulation. Their losses are not repaired, nor any proportional recruits made from any other parts of Nature' (Burnet, p. 45). There could be no cycle of processes for Burnet, despite the evidence of earthquakes, floods and landslides, the earth was a relatively stable planet. The processes that were evident made little difference to landforms both above and below the surface of the earth; they were the product of a singular catastrophe.

Caves and the Origin of Subterraneous Water.

For Burnet, the formation of caves came from the breaking up of the surface of the earth through the pressure of rising water from beneath, all in one cataclysmic event. The earth prior to this event was a smooth sphere and the cataclysm, the catastrophe, destroyed this uniformity and formed the mountains and caves. These landforms are the buckled and fractured ruins of the transformed earth. Burnet writes:

> subterraneous Waters, and all subterraneous Caverns and hollownesses, upon this supposition could not be otherwise. […] these subterraneous Vaults or holes, whether dry or full of Water, would be more or less in all places, where the parts fell hollow; yet they would be found especially about the roots of the Mountains, and the higher parts of the earth. (Burnet, p. 66)

Burnet argues that the 'subterraneous waters' found in caves are connected to the waters of the 'deep' that were partially responsible for the flood, and, as the 'deep' entry points are now largely beneath the sea, they are connected to this body of water also. Burnet is supported by two fellow theorists in this assumption: John Woodward in 1695[30] and William Whiston in 1696. Burnet does, however, acknowledge that some of these caves have been colonised by rain water or melted snow on mountain sides. This is interesting as Burnet is bound to the belief expressed in the scriptures yet he must acknowledge the observable evidence found in stream sinks and risings on a single mountain side, especially so when in flood. This is a hydrological fact well known at the time by farmers who depend on water in limestone country for their crops and livestock, and by miners who need to know where water comes from to avoid flooding. These practicalities generated a degree of implicit, local knowledge about permeable and impermeable rocks, about water tables and the salinity of water drawn from wells. This knowledge was perhaps static. Travellers in the eighteenth century published this kind of knowledge gleaned from farmers and it subsequently started to become mobile.

It is here that the anomalies necessarily begin to appear as the observations of material earth processes contradict scripture. The anomalies arise from the interconnected nature of natural phenomena. The more interactions in natural processes are identified, the

[30] John Woodward, *An Essay towards a Natural History of the Earth* (London: Bettesworth and Taylor, 1723), p. 131; William Whiston, *A New Theory of the Earth* (New York: Arno Press, 1978), p. 78.

greater the quantity of anomalies. The challenges came from other theologians and natural philosophers, such as Erasmus Warren, who sustained a dispute with Burnet over three books in the 1690s, and John Ray and John Keill. All three challenged Burnet on the origin of subterranean streams, this point being a crucial one as evident in the Royal Society's 1676 'Preface' to Volume 11 of *Philosophical Transactions*, quoted above. Warren challenged Burnet on his biblical evidence for the origin of springs being the 'deep' by questioning his example of water bursting from rocks in the desert, as recorded in Psalm 78: 'He clave the rocks in the wilderness and gave them drink as out of the great depths. He bought streams also out of the rock, and caused waters to run down like rivers' (15-16). Warren argued that Burnet was confusing the enormity of the catastrophic deluge with a relatively minor event; in reply, Burnet used Locke's observation about the Bible being a testimony of God's truth, asserting the dominance of orthodox thinking.[31] Though this appears to be an argument based on scripture there is ample evidence of water rising under pressure to the surface by way of, what is currently called, an artesian well, where water is confined in a permeable layer of rock or gravel and compressed by two layers of impermeable rock, the well at the surface being below the height of the local water table. Burnet comments on this observation, 'When we sink a mine or dig a well, the waters, when uncovered, do not leap out of their places, or out of those cavities, and flow upon the earth' (Burnet, 1965, p. 74). Unbeknown to the natural philosophers at the time, this is a very different source of water to springs in mountainous limestone regions.

Warren, Ray and Keill all raised the issue of cave systems in mountainous areas having their source from rain and melting snow, and claimed that Burnet had not given prominence to this. Burnet had written:

[31] Thomas Burnet, *An Answer to the Exceptions made by Mr Erasmus Warren against The Sacred Theory of the Earth* (London: Hooke, 1719), p. 75.

> 'Tis true all Subterraneous waters do not proceed from this original [the 'deep'], for many of them are the effects of Rains and melted Snows sunk into the Earth; but that in digging anywhere you constantly come to water at length, […] this cannot proceed from these Rains or Snows, but must come from below. (Burnet, p. 101)

Ray had argued, in 1691, that that water finds its way into caves by 'descending by Pores and Passages that there it finds into Chinks and Veins, and by confluence of many of them by degrees swelling into a stream' (Ray, p. 87). Ray agrees with Burnet about the biblical account of the deluge and its breaking up of the earth's surface but differs about the chief source of water rising at the surface. He also doubts that the caves and potholes evident at the surface are numerous and big enough to do the job of draining the flood waters.[32] For Ray, caves are not simply the ruinous remains of God's wrath but rather the useful and necessary product of his divine wisdom; they provide the water for the sustenance of all life on earth. Ray refers to Edmond Halley's address to the Royal Society in 1686, where he explains his experiments in the 'rising of water vapour from the sea' (Ray, p. 97). Halley describes how clouds travel from the sea and rise over mountains, and release their vapour in the form of rain:

> The rain falls, gleeting down by the Crannies of the Stone; and part of the Vapour entering into the Caverns of the Hills, the Water thereof gathers as in an Alembick into the Basons of Stone it finds, which being once filled, all the overplus of Water that comes thither runs over by the lowest place, and breaking out by the sides of the Hills, forms single Springs.[33]

[32] John Ray, *Three Physico-Theological Discourses, concerning the Primative Chaos and Creation of the World, the General Deluge, its Causes and Effects, the Dissolution of the World and Future Conflagration* (London: William Innys, 1713), p. 85.
[33] Edmond Halley, 'An Account of the Circulation of the Watery Vapours of the Sea, and of the Cause of Springs' *Philosophical Transactions* 17 (1686), p. 471. <http://rstl.royalsocietypublishing.org/content/17/192/468.full.pdf+html> [accessed 30 April 2018]

Halley illustrates an understanding of a catchment area within a cave, the extent of the water-table and old fossil, or abandoned, entrances used by flood waters as an overflow channel. Later, John Keill in his challenge to Burnet of 1698, quotes the same passage from Halley to support Ray and Warren, but also to challenge Burnet's argument about a smooth Antediluvian earth, as it is evident that a lack of mountains means a lack of fresh water.[34] In a letter to the Royal Society in 1666, Joseph Glanvil observed caves carrying subterranean streams that sank on the hill sides as rain and resurged at the base, implying an early grasp perhaps of the permeable nature of limestone, the rock at the surface, and the impermeable nature of the rocks lying beneath. He commented on his observations in the Mendip Hills, 'the country is not furnisht with many Rivers and Waters that rise upon the Hills: But from the bottom of the Hills there are many Springs round both to the North, South and West.'[35] He goes on to comment how these streams have a greater volume in the winter due to heavy rain. Robert Southwell's account of Captain Sturmy's descent of Penpark Hole near Gloucester, in 1669, reveals further knowledge of subterranean hydrology as Sturmy observes the water levels found deep in the cave. The cave was supposed to be linked to the nearby River Severn and the water levels were believed to rise and fall with the tides. This he proved to be false, 'by staying there from three hours Flood to two hours Ebb, in which time we found no alteration of this River. Besides its waters were fresh, sweet and cool, and the surface of this Water, as it is now at eight Fathom deep, lies lower than the bottom of any part of the Severn-Sea near us.'[36] Further evidence of the nature of subterranean streams was given by the publication of a letter to the Royal Society written by Johann Valvasor, a cave explorer

[34]John Keill, *An Examination of Dr Burnet's Theory of the Earth* (London: Clements and Harding, 1734), p. 47.
[35] Joseph Glanvil, 'Answers to Some of the Inquiries Formerly Published Concerning Mines' *Philosophical Transactions* 2 (1666) p. 526. <http://rstl.royalsocietypublishing.org/content/2/28/525.full.pdf+html> [accessed 30 April 2018]
[36] Robert Southwell, 'A Description of Pen-Park-Hole in Gloucestershire' *Philosophical Transactions* 13 (1683) p.3. <http://rstl.royalsocietypublishing.org/content/13/143/2.2.full.pdf+html> [accessed 30 April 2018]

from Carnolia (present day Slovenia), referring to the surveyed structure of a transient lake, Zirknitz, and the subterranean streams that both feed and drain it. It is an extremely thorough account of cave structures in limestone country, perhaps the most detailed of the seventeenth century.[37] Shaw describes how French natural philosophers had worked out the sources of spring water long before, the most notable being Bernard Palissy who gave lectures in Paris on the findings of his fieldwork on rainwater and springs between 1575 and 1584, and then later work by Pierre Perrault and Edme Mariotte who produced evidence concerning rainwater, springs and rivers between 1668 and 1670 (Shaw, p. 91).

These anomalies are drawn from observation though are assimilated into the essential theory which stresses the singular catastrophe of the flood. None of the natural philosophers are doubting the testimony of the scriptures, only each other's interpretation of it. The writers mentioned did embark on fieldwork, though perhaps to a limited extent regarding caves. Burnet does not refer to any descents he made prior to the publication of his theory, though he does show delight at the thought of the enormity of the subterranean world, and what lies beneath in the dark, unseen: 'How many Holes and Caverns, and strange subterraneous passages do we see in many countries; and how many more may we easily imagine, that are unknown and unaccessible to us?' (Burnet, p. 91). He writes about 'Caverns that never had the comfort of one beam of light since the great fall of the Earth […] We do not know when and where we stand upon good ground' (Burnet, p. 96). Ray refers to Pool's Cavern in Derbyshire as an example of a spring responding to heavy rainfall (Ray, 1713, p. 91). The references to actual descents in this period in support of theories tend to be reasonably accessible descents into mines and, what are now called, show caves, such as Pool's Cavern and Wookey Hole in the Mendip Hills of Somerset. The actual engagement with caves appears

[37] Johann Weichard Valvasor, 'An Extract of a Letter written to the Royal Society out of Carnolia, being a full and accurate description of the wonderful Lake of Zirknitz in that Country' in *Philosophical Transactions* 16 (1686) p. 411. <http://rstl.royalsocietypublishing.org/content/16/191/411.full.pdf+html> [accessed 30 April 2018]

to be relatively small, yet they inspire the imagination and remain central to the natural philosophers' understanding of the current form of the earth. The problem though is that such a small range provides merely a local and limited manifestation of caves. Pool's Cavern alone tells us very little about caves. Two theorists did attempt to extend their experience further afield and assign their discoveries to the Bible: John Woodward and John Hutchinson.

Cave Geomorphology and Erosion.

Woodward wrote *An Essay towards a Natural History of the Earth* in Latin, and his translator, Benjamin Holloway, a Fellow of the Royal Society, wrote in his introduction to the 1726 edition that the issues that would most gratify and entertain the curiosity of the reader are the advances made in understanding the 'great Abyss,' formed out of the catastrophe of the flood: 'This is indeed a new Province in Philosophy: and we have here open'd to us a Scene in Nature that had hardly ever been thought of before.'[38] Woodward was an active fieldworker, he descended into caves and mines and asked local excavators to tell him when they opened up a new mine or sank a well. He was particularly interested in the gathering of fossils, urging readers to do so as well.[39] He writes: 'The Abyss lyes wholey in the Dark, shut up and conceal'd from all Mortal Eyes' (Woodward, p. 47). He was going to go where few dared, he was willing to make his descent and bring back evidence to upset the theories of Burnet. Unlike Burnet, Woodward wrote of his descents of caves and mines though gave us no particular descent narratives:

> I have carefully search'd the principal Mines of our Island, and the Bowels of the Earth by whatever Means laid open to View; observing the Strata of every Sort of terrestrial Matter. (Woodward, p. 2)

[38] John Woodward *The Natural History of the Earth* (London: Ellis, 1726), p. 6
[39] His collection can currently be seen in Cambridge University's Sedgewick Museum.

His descents, and those of miners he spoke with, revealed strata, or individual beds of rock, 'to the greatest Depth we ever dig or mine' (Woodward, p. 47). This observation of strata led him to believe that as the earth's surface was dissolved during the flood, it settled out through specific gravity when the flood waters retreated down into the abyss, leading to layers of rock and fossils. Where heavy rocks and fossils found their way to the surface instead of sinking, it was because they were slabs that did not dissolve and had floated into place in the turmoil.

Woodward's field assistant and student, John Hutchinson, disagreed strongly and refused to allow Woodward use of his field notes in supporting his claims, claims which Hutchinson believed undermined biblical authority. Hutchinson called him 'our undertaker' (Hutchinson, 1724, p. 98). It was simple for Hutchinson: gravity cannot be used to account for God's will. Gravity is not the final cause, God is the final cause: 'So long as Gravity stands, Moses cannot be explained' (Hutchinson, p. 98). Even as an astute natural philosopher, Hutchinson was keen to stress the limit of curiosity and inquiry. He believed philosophers like Woodward were searching too far:

> Ever since the Creation of Man, it has been the constant Employment of the Devil, who has nothing of his own, but his Rebellion, to set up the works of God in opposition to God, and to persuade Man that there were Properties in them independent of God, or incommunicable. (Hutchinson, p.22)

The search motif of Burnet and Woodward generated a contrary narrative of forbidden knowledge: elements of nature were hidden by God for good reason, according to philosophers like Hutchinson. John Ray also argued that the Aristotelean theory of eternalism or the Epicurean atomic theory were the attempts by atheists to evade the natural arguments for the existence of God (Ray, 1704, p. 33). The search motif, or natural revelation, clearly brought philosophers close to what was perceived as Spinoza's dangerous ideas concerning the equivalence God and nature. Philosophers such as Ray and Hutchinson feared that the

revelation of sources of things and causes hidden in the remote obscurity of nature would lead to a belief of God's immanence in nature or, much worse, in God's absence.

Hutchinson had collected field data from around Britain and had clearly observed and recorded evidence of rock strata and the process of erosion, transport and deposition; however, the data had to coincide with orthodox thought, for he believed the retreating flood waters were responsible for all he observed:

> For the water falling towards the Apertures of the Abyss, in such vast Quantity as was then upon the surface, and with great force would bear away with it even Mountains, and all Matter, and Bodies, that were not firm enough to resist and withstand it.[40]

His fieldwork in Westmorland, Cumberland and Yorkshire revealed to him springs in valley floors fed by sinks higher up the mountain, huge boulders transported from their place of origin (glacial erratics), rocks made up of other rocks (conglomerates), angular fragments of rock at the foot of mountains and rounded rocks high on mountains, rivers and streams eroding their banks and exposing layers of earth, sand, clay and rounded cobbles, and fissures in many rocks but especially limestone. He observes cave passages across Yorkshire and some that run under surface streams. For Hutchinson, this is erosion, transport and deposition in many forms though not over long periods of time for there is no time in which it can be sustained, for the Bible states it takes only a matter of days for the waters to retreat. The size of the boulders is evidence that it did not all happen at once, and their position on hillsides is due to a varied degree of force. The springs in the valley floor are caves formed by the initial arrival of the abyssal waters truncated by the force of the retreating waters. These observed and measured variations were caused by 'a few minutes' difference' in the time of the retreat (Hutchinson, p. 40). Hutchinson is inspired by Locke's empiricism and records observations of

[40] John Hutchinson, *Observations Made by JH, mostly in the Year 1706* (London; [n. pub.], 1710), p. 4.

detail and accuracy though he will not yet think out of biblical orthodoxy; what he observes is assimilated into it.

This orthodoxy is sustained further with theologian, Alexander Catcott's book from 1761, *A Treatise on the Deluge*. Catcott, a vicar who visited many caves, was a follower of Hutchinson and quotes passages from his *Observations* in support of his own *Treatise*.[41] Like Hutchinson, Catcott observed, measured and recorded subterranean phenomena and generated anomalies that he assimilated into the existing theory. He observes, for example, that cave entrances are small compared to the vast caverns that lie below. He also observes that many small streams converge to form larger ones; this he explains by stating that the originally large entrances are above the chambers and blocked with debris from the retreating flood waters (Catcott, p. 336). He provides an example of this with Eldon Hole in Derbyshire, where from the evidence of two men lowered down the initial shaft of 'seventy yards' they notice a lower entrance to another high, parallel chamber. Catcott then identifies a shakehole, or slump, in the surface above the parallel shaft, providing evidence for a plugged shaft (Catcott, p. 338). Nearby Peak Cavern has a huge entrance but soon closes into a series of narrow passages with occasional large chambers; this he explains by way of the initial surge of flood water through both small and wider passages combining to form the much larger entrance (Catcott, p. 340).

Catcott described his visits to caves in Monmouthshire, Pembrokeshire, Gloucestershire and Somerset. He adds the caves of Yorkshire by quoting an article from *The Gentleman's Magazine* from March 1761 written by someone under the pseudonym of 'Pastor.' This writer has since been identified as John Hutton.[42] He was then a Cambridge undergraduate, who grew up in and around the West Riding of Yorkshire. He was later to write

[41] Alexander Catcott, *A Treatise on the Deluge* (London: Allen, 1768), p. 70.
[42] Trevor Shaw, 'John Hutton, 1740? – 1806. His "Tour to the Caves" and his Place in the History of Speleology' in *Studies in Speleology Vol. 2, Parts 3-4, 1970-71,* pp. 109 – 128.

a much longer article on caves, which included this one from *The Gentleman's Magazine*, for the addendum of Thomas West's second edition of *A Guide to the Lakes* in 1780, called 'A Tour to the Caves.' This was then published independently, with a section on geomorphology, in 1781. This was the first complete cave guide published in Britain and was hugely influential in the development of the field of cave science as well as theories of cave morphology. However, even at this late stage, the biblical theory holds strong for Hutton who believes his philosophical speculations are concurrent with the writing of Moses. He believes erosion has formed caves but only erosion of the softer material left in the cave after the retreating flood water. He also includes all the information on local subterranean hydrology gleaned from local farmers. Hutton's writing provides an example of how local knowledge drawn from experience is mobilised and becomes a resource for rational deduction.

Caves and Deep Time.

The references in eighteenth-century writing to the ultimate agency of nature are particularly evident in the writing of an emerging generation of curious travellers, academics and professional engineers, who spent more time experiencing and observing caves than interpreting the Bible. They were not associated with the old natural philosophers. The issue with the discourse of nature was still problematic, especially with the cave. Caves were invisible for much of the time and when entered became embodied experiences that challenged any idea of detached observation. The issue of temporality made these observations even more anomalous, as it was increasingly evident that caves existed and have been developing in a period of time that stretched beyond human history as calculated in the Bible.

Observation and experimentation were always going to present anomalies for an argument ultimately based on miracles, as Woodward had already shown. As we have seen in the previous section, it was how the philosopher presented the case, in what context they

placed it and what claims they made that determined the response. In 1713, Edmond Halley, began an attempt to measure the salinity of the seas and lakes that emit no rivers to discover the rate of accumulation over time.[43] This was science and the application of reason, not biblical scripture, measuring the age of the earth. He comments that many are currently working on ascertaining the age and have been for some time. Halley's article did not receive any critical challenges; there are no responses to it in subsequent volumes of *Philosophical Transactions*. This may be due to the way he presented the argument. He presents the possibility that each day of biblical creation was a thousand years as Adam found earth to be already full of creatures when we were created. He also argues that the key purpose is to 'refute the ancient Notion, some have of late entertained, of the Eternity of all Things.' This Aristotelian theory, that proposes the duration of the earth to be eternal, appeared to be the main attack on the biblical theory and as such his research could be assimilated into it. This study, with the help of the Royal Society, would show it to be false. However, Halley follows up his attack on the notions of the eternity of the earth with what appears an afterthought: 'though perhaps by it the World may be found much older than many have hitherto imagined' (Halley, p. 300).

Other challenges to the biblical perception of the age of the earth did not get away so easily. Patrick Brydone published *A Tour through Sicily and Malta* in 1770, a best-selling travel book that went through numerous editions. His account includes a conversation with Canonico Recupero, a local canon who is writing the history of Mount Etna in Sicily.[44] Recupero acts as his guide and shows him a well that has been recently dug up during an archaeological dig. In descending the well, the canon identifies many layers of lava and soil and given that

[43] Edmond Halley, 'A Short Account of the Cause of Saltness of the Ocean, and of the Several Lakes that Emit no Rivers; with a Proposal, by Help thereof, to Discover the Age of the World' *Philosophical Transactions* 29 (1714) pp. 296-300. <http://rstl.royalsocietypublishing.org/content/29/344/296.full.pdf+html> [accessed 30 April 2018]
[44] Patrick Brydone, *A Tour through Sicily and Malta* (London: Strahan and Caddell, 1792), p. 70.

they have identified the age of the layers of lava and soil on the surface, from early Roman records of eruptions, at two thousand years old, the layers exposed in the well add up to at least 14,000 years. This causes a major concern for the Canon as it is a direct challenge to the given age of 6,000 years as stated by Moses. His bishop tells him not to pretend to be a better historian than Moses, 'nor to presume to urge anything that may in the smallest degree be deemed contradictory to his sacred authority' (Brydone, p. 70). The Canon tells Brydone that he is exceedingly embarrassed by his discovery, and that 'Moses hangs like a dead weight upon him, and blunts all his zeal for inquiry; for that really he has not the conscience to make his mountain so young, as that prophet makes the world' (Brydone, p. 70). Recupero clearly sees the material reality of the lava and weathered soil; he uses his reason and applies measurement and attention to authoritative sources and computes a reasonable answer. He cannot say it is 14,000 years old though neither can he say it is 6,000 years old; he has been silenced, except that he tells Brydone who publishes the conversation. This account comes to the attention of Richard Watson, the Bishop of Llandaff who in 1777, while attacking Edward Gibbon, directs his anger at Recupero.[45] Watson initially challenges Recupero because he clearly expresses doubts about Moses' account of the catastrophe and of biblical time, which is symptomatic of an increasing number of views challenging biblical orthodoxy, not least those of Edward Gibbon. He presents his attack on rational grounds, arguing that he does not know that the lava at the surface is that mentioned by Diodorus Siculous; the consistency of the lava may vary and so may its weathering. He goes on to state that 'it would have been full as well to have shut his mouth with reason, as to have stopped it with the dread of an ecclesiastical censure' (Watson, p. 245). It is a mark of the fragility of their position perhaps that makes him conclude this account with a reason for his attack, it is so as not to suffer 'a minute philosopher to rob us of our religion' (Watson, p. 245).

[45] Richard Watson, *An Apology for Christianity, in a Series of Letters Addressed to Edward Gibbon, Esq.* (London: Caddell and Davies, 1791).

A further challenge came through George Hoggart Toulmin whose book, *The Antiquity and Duration of the World*, first published in 1780, went through several editions. For Toulmin, Watson's response is typical of the orthodox clergy as they are 'unequal however to the task of reasoning pertinently, on a matter of such intricate investigation, they heedlessly adopt the reigning principles.'[46] Toulmin was a young and articulate man arguing strongly for the Aristotelian view of 'eternalism'; he refers to the prevailing orthodoxy as 'the dreams and superstitions of illiterate barbarians' (Toulmin, p. 5). He argues for a steady uniform process of erosion and heat-generated mountain building over an immeasurable period; the evidence comes from caves and the prime agent is nature:

> the fissures and caverns of rocks are the great workhouse, where nature carries on such curious operations. And even those very caverns and fissures […] are themselves formed, and everywhere surrounded with immense masses of matter, replete with impressions of every species of animated nature; and carrying themselves, in their very construction, undeniable proofs of the most progressive, slow and uniform formation. (Toulmin, p. 112)

For Toulmin, nature operates in caverns deep beneath the earth and hidden down there are the traces of every species of life that has existed. He too employs the revelatory search motif of natural philosophy. He highlights who he sees as the 'real philosopher': 'Regardless of the voice of falsehood and of folly, he listens with rapture to that of nature and of truth, under whatever circumstances they may be concealed' (Toulmin, p. 8). The disclosure of the hidden secrets of nature establishes truth while adhering to literal readings of the scriptures produces falsehood.

Toulmin argues life on earth is cyclical and not linear. The cycles of life, through fluctuation and transmutation, are uniform: 'the continual formation and decay of every

[46] George Toulmin, *The Antiquity and Duration of the World* (London: Caddell, 1780), p. 2.

existing substance, the unceasing circulation of matter that has been so copiously explained, produces no disorder' (Toulmin, p. 197). There is no place for catastrophic floods that transform the entire surface of the earth in a matter of days; change comes gradually, and this gives rise to the theory of 'gradualism'. He provides evidence for this transformation of the animate into the inanimate through the fossils of marine creatures found in limestone. Toulmin suggests that inflexible believers of the Bible are trapped in a literal interpretation because they are deluded through 'the love of self' (Toulmin, p. 190). They believe everything was created especially for them: 'the whole magnificent scene of things is daily and consistently asserted to be ultimately intended for the peculiar convenience of mankind' (Toulmin, p. 190). Until they recognise the enormity of geological time, natural processes and interactions, and cave space, and rid themselves of this anthropocentric view of the world, Toulmin argues that they will remain deluded. Toulmin reverses Boyle's warning about Godless delusion.

As with Brydone's report of Recupero's Etna observations, Toulmin's book soon drew criticism. The most notable attack came in book form from Ralph Sneyd, Rector of Jevington and Vicar of Rye, in 1783, who titled his book as a direct letter to Toulmin.[47] Toulmin's argument was carried by a forceful rhetoric, and Sneyd's response no less so; he begins by stating he is a tolerant man though Toulmin's book 'transgresses the bounds of decorum and common sense,' that it 'opposes the most manifest and incontrovertible truths,' and it 'strikes at the root of all religion.' He concludes that, tolerant though he is, with 'the grossest and most opprobrious terms' conveyed by Toulmin: 'I glory to acknowledge, that my indignation becomes fired' (Sneyd, p. 2). As is evident in Watson's response to Brydone, Sneyd comments

[47]Ralph Sneyd, *A Letter to Dr. Toulmin, MD. Relative to his Book on the Antiquity of the World* (London: Lee and Rivington, 1783).

that such attacks on biblical authority are all too common now; Recupero's observations and Toulmin's theories are not isolated occurrences. Sneyd calls for the establishing of

> an hospital, under the regulation of men of distinguished piety and learning, where by proper discipline, a lowering diet, and well directed course of study, rigorously inforced on all notoriously sceptical delinquents for a certain time, much mischief might be prevented. (Sneyd, p. 5)

Sneyd argues that without a fear of the final judgement, evil would prevail; without the prospect of eternal life our earthly life would be empty and meaningless.

Perhaps the earliest expression of deep time and gradualism was made by philosopher David Hume whose book was published posthumously in 1779; it was initially written in 1751 and revised in 1757.[48] In the dialogue, Hume's sceptic, Philo, argues that evidence can be traced across the face of the earth that all parts have been for ages beneath the surface of the sea, and that these surfaces are constantly undergoing transformations, that 'matter be susceptible of many and great revolutions, through the endless periods of eternal duration.' Within the constant changes existed an order that maintained the endless cycle of denudation and renovation; Philo saw 'an eternal, inherent principle of order to the world; though attended with great and continual revolutions and alterations' (Hume, p. 50). This earliest expression of gradualism was perhaps, like Halley's point about deep time, presented without any direct challenge to orthodoxy. Hume carefully has a character utter the heretical point of view rather than express it directly himself.

These characters are not allied to the early natural philosophers. Brydone is a member of the new travel writing class, Recupero is a lone modest cleric, Toulmin a physician, and Hume a philosopher whose book was only published after his death. Other writers raising

[48] David Hume, *Dialogues Concerning Natural Religion* ed. by Dorothy Coleman (Cambridge: Cambridge University Press, 2007).

anomalies with orthodox biblical thought would also appear as outsiders, William Hoosen and John Whitehurst as professional mining engineers, James Hutton and John Playfair as academics, and Joseph Black and William Nicholson as chemists, and perhaps most importantly of all, Adam Walker as engineer, inventor, chemist, astronomer, teacher and cave explorer.

Joseph Black, Fixed Air, Carbon Dioxide and Limestone Solution.

Ruston argues that romanticism should be 're-considered as a more culturally inclusive term that incorporates science and medicine with literature.'[49] Developments in natural philosophy in the mid-eighteenth-century provide evidence that science, in the form of chemistry, and medicine combined in attempts to cure the ailment of kidney and bladder stones. Practitioners searched for chemical ways to dissolve the calcareous stones within the body. This search generated a dramatic narrative of convoluted kitchen concoctions that were so toxic and corrosive they would either kill or cure the patient; one such remedy won its inventor a government award. The potentially lethal remedy and numerous case study narratives of trial and error led chemists to isolate the element that may dissolve the calcareous stone and become an effective medicine. This process would lead to the understanding of limestone solution and the corrosive formation of caves through the action of acidic water. It appears to be a serendipitous discovery, however, though possible, it could owe much to where it was discovered. Jan Golinski argues that 'experimental phenomena that lie at the core of science are produced in distinctive local settings.'[50] The experiments of Joseph Black at Edinburgh University and close cooperation and involvement with the ideas and work of his friends and colleagues James Hutton, John Playfair, David Hume and Adam Smith, among others, ensured

[49] Sharon Ruston, *Creating Romanticism: Case Studies in the Literature, Science and Medicine of the 1790s* (Basingstoke: Palgrave Macmillan, 2013), p. 177.
[50] Jan Golinski, *Science as Public Culture: Chemistry and Enlightenment in Britain, 1760 – 1820* (Cambridge: Cambridge University Press, 1992), p. 2.

his discoveries in chemistry formed the basis for Hutton's proposals in the emerging science of geology. Golinski writes:

> The experience of enlightenment, involving certain patterns of communication and social interaction – a certain way of life in the public realm – is of key importance in the extension of scientific knowledge. (Golinski, p. 6)

Porter has argued that geology has been reliant on other antecedent sciences, especially chemistry, and is dependent on social and institutional foundations.[51] One of the fundamental developments in geology, and the single, most important in cave science, came about through the cooperation of a group of natural philosophers in Edinburgh in the 1750s, and a combination of narrative, medicine, chemistry and geology.

In 1802, the chemist, Humphry Davy argued that the phenomena of different substances being soluble in water could only be explained through the principles of chemistry. As a reference to the growing specialisation of science, in his *A Discourse Introductory to a Course of Lectures on Chemistry*, he argued that natural philosophers could not explain natural history without the aid of chemists:

> Natural history and chemistry are attached to each other by very intimate ties. For while the first of these sciences treats of the general external properties of bodies, the last unfolds their internal constitution and ascertains their intimate nature. Natural history examines the beings and substances of the external world, chiefly in their permanent and unchanging forms; whereas chemistry by studying them in the laws of their alterations, develops and explains their active powers and the particular exertions of those powers. (Davy, p. 312)

[51] Roy Porter, The Making of Geology: Earth Science in Britain 1660 – 1815 (Cambridge: Cambridge University Press, 1977), p. 6.

Davy is not only expressing the necessity for cooperation between laboratory scientists and field scientists, he is acknowledging the interconnected nature of natural history, in that nothing in nature exists in isolation. To understand caves, the curious and speculative traveller needed to understand water and the atmosphere from which it came.

Although the biblical narrative of the flood appeared to account for the formation of limestone caves throughout most of the eighteenth century, it is evident from its early years that chemists knew limestone, or calcareous earth, could be dissolved by acidic water. Though not named until the nineteenth century, the early understanding of limestone solution coincided with the discovery of carbon dioxide; in the eighteenth century it was called 'fixed air' or 'carbonic acid gas.' As Rudwick has argued, many natural philosophers accepted the biblical account publicly while not believing it literally. Halley's experiments with salt-water and his conclusions about the age of the earth did not address the biblical time narrative and, as such, passed unchallenged, whereas Toulmin's book on the duration of the earth was a direct attack on biblical interpretations and generated a stern defence. The chemical trace of carbon dioxide and its role in limestone solution begins with Isaac Newton's *Optics,* and continues through the medicine and chemistry of Joanna Stephens, Stephen Hales, Robert Whytt, Joseph Black, David Macbride and Henry Cavendish. Of this group, the geologist, James Hutton and his associate John Playfair, recognised Joseph Black, their colleague at Edinburgh University, as the chemist who made the breakthrough in understanding carbon dioxide and limestone solution.

Newton, in Queries 30 and 31 in his *Optics* (1721), refers to a gas, or air, that chemists claim is 'fixed:'

> [Particles that cohere strongly] are the bodies which chymists called fixed [non-volatile], and being rarefied by fermentation, become true permanent air; those particles receding from one another with the greatest force, and being most difficultly

> brought together, which upon contact cohere most strongly. And because the particles of permanent air are grosser, and arise from denser substances than those of vapours, thence it is that true air is more ponderous than vapour, and that a moist atmosphere is lighter than a dry one. (Newton, p. 182)

The chemists he would be referring to here would be Robert Boyle and the Flemish chemist, Jan Baptista van Helmont. It was van Helmont, in the 1640s, who after burning charcoal discovered a substance that prevented the ignition of a flame. He called it 'spiritus sylvester' (spirit of the wood – or wild spirit). This discovery also led him to coin the word 'gas,' drawn from the Flemish pronunciation of 'chaos.'[52] It was clear that burning or decaying organic matter and calcareous earths released a 'gas' of some sort. This passage from Newton acknowledging the density of this air that has been perceived as fixed, was the motivation for Stephen Hales' chemical experiments into the morphology of vegetable (carbon) substances: *Vegetable Staticks* (1727). He selected an impressive array of vegetable substances to experiment upon with fire and fermentation, and discovered they all produced this gas. Hales' text shows that scientific writing still drew on literary style. He refers to particles being 'elastick' or 'fixed', with forces of 'repulsion' and 'attraction' in what he calls 'this beautiful frame of things.' He writes: 'Whence it is reasonable to conclude, that our atmosphere is a Chaos, consisting not only of elastic, but also of un-elastick air particles.'[53] He imagines a world where all particles are attracted and where all would be 'one unactive cohering lump.' It is necessary, he states, that there exist a 'due proportion of strongly repelling elastick particles' to 'enliven the whole mass.' The air that is released from these substances only by fire or fermentation is until that point fixed. Hales establishes the name, fixed air, in the following question:

[52] Paul Strathern, *Mendeley's Dream: The Quest for the Elements* (London: Penguin, 2001), p. 162.
[53] Stephen Hales, *Vegetable Staticks* (London: William Innys, 1727), p. 315.

> Since then this is the case, may we not with good reason adopt this now fixed, now volatile *Proteus* among the chymical principles, and that a very active one […] not withstanding that it has hitherto been overlooked and rejected by Chymists, as no way intitled to that denomination? (Hales, p. 316)

The fixed air is compared to Proteus, the elusive god; he then refers to it as Hermes, emissary of the gods, when criticizing the work of alchemists. He writes:

> If those who unhappily spent their time and substance in search after an imaginary production, that was to reduce all things to gold, had, instead of that fruitless pursuit, had bestowed their labour in searching after this much neglected volatile *Hermes*, who has so often escaped thro' their burst receivers, in the disguise of a subtle spirit, a mere flatulent explosive matter; they would then instead of reaping vanity, have found their researches rewarded with very considerable and useful discoveries. (Hales, p. 316)

Hales understands this discovery as the crossing of a threshold in chemistry; if it is not the most important break with alchemy, it is certainly a significant one. Fixed air is elusive, 'disguised' and 'subtle.' Though Hales includes classical gods in his description, he does not appear to use the classical descent narrative to the underworld in search of discoveries. However, in his preface he engages the trope of the hidden, and forbidden, knowledge of nature, something of an experimental descent narrative:

> The wonderful and secret Operations of Nature are so involved and intricate, so far out of the Reach of our Senses, as they present themselves to us in their natural Order, that it is impossible for the most sagacious and penetrating Genius to pry into them, unless he will be at Pains of analysing Nature by a numerous and regular Series of Experiments, which are the only solid Foundation whence we may reasonably expect to make any Advance in the real Knowledge of the Nature of Things. (Hales, p. vii)

Hales' book, and particularly Chapter VI and 'The Analysis of Air', was perceived as a classic by mid-eighteenth-century chemists. David Macbride would later use the above quotation as the epigraph to his own book on chemistry and fixed air (1767). The quotation shares the approach of those natural philosophers and cave explorers who search into 'the hidden recesses of nature.' The person capable of doing this must go beyond mere curiosity and embrace 'pain' if he or she wishes to cross the threshold into knowledge of nature.

The search for the elusive gas was given a surprising stimulus through the search for a cure of kidney and bladder stones, in which Hales played a significant part. These calcium and magnesium stones, or calculus as they were called, were a major medical issue in the early eighteenth century and numerous cures were devised to avoid the necessity of surgery. Joanna Stephens assembled a decoction, a powder and pills in the 1720s to cure both the kidney and bladder stones, and there appeared to be evidence that it worked. She was awarded five thousand pounds by an Act of Parliament for her discovery. The problem with the medicine was that it was made up of crushed egg-shells, snails, herbs, soap and honey and, in most cases, was indigestible or nauseous. Stephens wrote about her cure: 'These medicines do frequently cause more Pain at first, in which Case it is proper to give an Opiate, and repeat it as often as there is Occasion.'[54] Hales and Robert Whytt were convinced that most of the ingredients were unnecessary and attempted to isolate the one that worked. They recognised soap, and its attendant quick-lime, as a substance that would dissolve the calculus yet it was long known to be highly corrosive and caustic, it would kill animals, and patients, and corrode copper, brass and iron. They tried lime-water rather than quick-lime and found that it did dissolve the calculus in the laboratory, but it did not appear to be effective when drunk. They also saw that 'common water will dissolve calculus outside the body.'[55] At this

[54] Joanna Stephens, *A Most Excellent Cure for the Stone and Gravel* (London: publisher unknown, 1740), p. 6.
[55] Stephen Hales, *An Account of Some Experiments and Observations on Mrs Stephen's Medicines for Dissolving the Stone* (London: Woodward, 1740), p. 26.

stage they did not know that 'common water' absorbed carbon dioxide from the atmosphere to form a weak carbonic acid, and that this will dissolve, very slowly, calcareous substances, such as limestone. However, they did know it happened but did not know how. In 1743 Whytt studies his experiments and concludes: 'As we find even the hardest Rocks yield to common Water.'[56] To illustrate his scientific point, Whytt quotes the poet Ovid in Latin, from his *Art of Love*, Book One (here translated by John Dryden in the contemporary edition, 1716):

> Water is soft, and Marble hard; and yet
>
> We see, soft Water through hard Marble Eat.[57]

Both Hales and Whytt identify the fixed air being released from the calcareous elements in Stephen's medicine, and from the calculus, though they cannot establish a cure that works within the patient. However, from a geological perspective Hales and Whytt are starting to establish an elementary understanding of limestone solution. They are not geologists, nor do they suggest any interest in caves, yet as Porter argues, geologists need chemists to advance their knowledge of earth processes.

A colleague of Whytt's at Edinburgh University, and a chemist influenced by Newton's *Optics* and Hales' 'Analysis of Air,' was Joseph Black who also studied medicine and was interested in the kidney and bladder calculus experiments. He decided to write his doctorate thesis on the properties of a milder alkali capable of dissolving calculus than those studied by Hales and Whytt, those of magnesia alba (white magnesia). He did not find a cure though the way he went about trying to find one established him as one of the most important and celebrated chemists of his time. Black's doctorate dissertation of 1754, published in Latin, made his mark within a small circle at Edinburgh but it was his English translation and

[56] Robert Whytt, *An Essay on the Virtues of Lime-Water in the Cure of the Stone* (Dublin: Watts, 1762), p. 23.
[57] Ovid, *Ovid's Art of Love. In Three Books. Together with his Remedy of Love* trans by. John Dryden (London: Taylor, 1716), p. 3.

expansion of the dissertation in 1756 that brought his discoveries to a much wider audience, including the French chemist, Antoine Lavoisier.

Black's method of weighing his substances before and after reactions was meticulous. John Gribben writes of Black's experimental method: '(Black) pioneered the application of accurate quantitative techniques to chemistry, measuring everything that went into a reaction and everything that came out.'[58] It was this experimental approach that enabled him to be much more precise in his identification of fixed air than Hales. Black focused his attention on rocks, whereas Hales had experimented on vegetation. Black identified the fixed air as a 'particular species of the atmosphere,' a discovery that led him to realise that the atmosphere was made up of several gases. Rather than coin a new name for this gas, he chose to keep the term Hales had given to the more general concept:

> To this I have given the name of *fixed air*, and perhaps very improperly; but I thought it better to use a word already familiar in philosophy, than to invent a new name, before we be more fully acquainted with the nature and properties of this substance, which will probably be the subject of my further inquiry.[59]

Though he had discovered the gas, it remained elusive. Like Hales and Whytt, Black referred to the gas as a 'subtile,' 'imprisoned in the body (of the substance),' 'set free, and rendered fluid and elastic by the fire,' and as having 'vanished from their senses' (Black, p. 32). It is evidently difficult to describe this gas without the use of metaphor. In his experimental method and discovery, Black has advanced eighteenth-century chemistry, yet his discourse is not yet fully removed from the literary science of van Helmont's 'spirit of the wood', Hales' 'elusive Proteus' and Whytt's Ovid.

[58] John Gribbin, *Science: A History, 1543 – 2001* (London: Penguin, 2003), p. 243.
[59] Joseph Black, *Experiments upon Magnesia Alba, Quick-lime, and Other Alkaline Substances* (Edinburgh: Creech, 1782), p. 73.

Black identified the gas produced by heating limestone to be an essential part of the substance and once it had gone the quick-lime that remained would not effervesce with acid. Black observed:

> It is sufficiently clear, that the calcareous earths in their native state, and that the alkalis and magnesia in their ordinary condition, contain a large quantity of fixed air; and this air certainly adheres to them with considerable force, since strong fire is necessary to separate it from magnesia; and the strongest is not sufficient to expel it entirely from fixed alkalis, or take away their power of effervescing with acid salts. (Black, p. 49)

In identifying the aeriform substance that would later be called carbon dioxide, Black had made a significant breakthrough in chemistry and in the experimental method. Henry Guerlac writing two hundred years after Black's experiment wrote:

> The 'Experiments upon Magnesia Alba' was soon recognised for what it is: a brilliant model, perhaps the first successful model, of quantitative chemical investigation, as well as a classic exemplar of experimental science worthy of comparison with Newton's *Opticks*.[60]

What is perhaps less well known is the impact Black's experiments had on the, yet unidentified, field of cave science. Black's student, David Macbride, followed his experimental method in examining vegetable and animal matter, discovering fixed air in all of them. In doing so he also recognised the solubility of fixed air in water.[61] Black knew that the fixed air contained in chalk acted like a weak acid; between them they had grasped the property of carbonic acid and its ability to dissolve limestone rock, in which caves form. A process the poet

[60] Henry Guerlac, 'Joseph Black and Fixed Air. A Bicentenary Retrospective', *Isis*, 48, 2 (1957), p. 125.
[61] David Macbride, *Experimental Essays on Medical and Philosophical Subjects* (Dublin: Ewing, 1767), p. 37.

Ovid could see but have no idea as to how it was chemically being done. In 1766, Henry Cavendish proved that fixed air was soluble in water and published his results in *Philosophical Transactions.* Cavendish concluded his experiment:

> The air produced by dissolving marble in spirits of salt, was caught in an inverted bottle of water, in the usual manner. In less than a day's time, much the greatest part of the air was found to be absorbed. The water contained in the inverted bottle was found to precipitate the earth from the lime-water; a sure sign that it had absorbed fixed air.[62]

The paper describes all the quantitative experiments Cavendish carries out to discover how much fixed air water can absorb, and he discovers that it is a considerable quantity. What he also discovers is of crucial importance in what we now understand as the carbon cycle: warm water absorbs less fixed air (carbon dioxide) than cold water. Cavendish explains his findings:

> It appears from an experiment […] that water absorbs more fixed air in cold weather than warm; and, from the following experiment, it appears, that water heated to boiling point is so far from absorbing air, that it parts with what it has already absorbed. (Cavendish, p. 163)

These chemists were not natural philosophers in the field of geology, nor were they interested in visiting and exploring caves, but the discovery they had made would transform the way cave morphology was understood. The early biblical theorists were right to identify water as the key agent of cave formation but it was not miraculous tectonic forces that catastrophically opened them up for the flood waters; it was the slow and steady corrosion of slightly acidic rain water over thousands of years that was responsible. Though Black was not a geologist,

[62] Henry Cavendish, 'Three Papers Containing Experiments on Factitious Air' *Philosophical Transactions* 56 (1766) p. 159. <http://rstl.royalsocietypublishing.org/content/56/141.full.pdf+html> [accessed 30 April 2018]

his friends and colleagues at Edinburgh University, James Hutton and John Playfair, were and they saw the significance of his discoveries and their application to their theory of earth processes.

James Hutton and Limestone Solution.

Black, Macbride and Cavendish were transforming the quantitative chemical method and making significant discoveries as they did so; however, the point of inquiry of this thesis is how their discoveries impacted on geology and cave morphology. Black was a populariser of his work; he gave public lectures and ran courses in chemistry for non-scientists. Golinski observes, 'The lecture hall remained the prime site at which the public profile of Black's science was created' (Golinski, p. 48). The diarist James Boswell records in his diary of June 1775: 'I attended a course of chemistry by Dr. Black between two and three. We were mostly lawyers who agreed to take a course.'[63] In December of the same year, Boswell attends a public lecture: 'Dr. Black's lecture on gold really laid hold of my attention.' (Boswell, *Ominous Years*, p.201.) By 1781 Boswell is joining him for dinner, along with the geologist, James Hutton: 'In the evening I went to Sir John Pringle's as a recompense for disturbing him yesterday at dinner. Drs. Black, Hutton, and Rutherford, and Hamilton of Bangour came and all stayed to his cold meat. We were pretty cheerful.'[64] Here, Boswell draws attention to the relationship between Black and Hutton and the social circles in which they mixed. Black and Hutton were founders of the Oyster Club in Edinburgh, along with John Playfair, David Hume and Adam Smith.[65] Hume had already suggested the theory of gradualism in his

[63] James Boswell, *Boswell: The Ominous Years 1774 – 1776* ed. by Charles Ryskamp and Frederick Pottle (London: Heinemann, 1963), p. 160
[64] James Boswell, *Boswell: Laird of Auchinleck 1778 – 1782* ed. by Joseph Reed and Frederick Pottle (New York: McGraw-Hill, 1977), p. 394.
[65] John McPhee, 'Basin and Range' in *Annals of the Former World* (New York: Farrar, Straus and Giroux, 2000), p. 74.

Dialogues Concerning Natural Religion (1757), and John Playfair, though a mathematician, was Hutton's field companion when on geological excursions. Black and Hutton help found the Royal Society of Edinburgh in 1783. It is evident that they discussed each other's work and Black features prominently in the publications of both Hutton and Playfair.

In Hutton's 1788 thesis, he argues that geology relies on chemistry to discover the changes rocks go through with heat, pressure and weathering, the point that Davy reiterates in his 1802 *Discourse*. Hutton writes:

> And here the science of Chemistry must be brought particularly to our aid; for this science, having for its object the changes produced upon sensible qualities, as they are called, of bodies; by its means we may be enabled to judge of that which is possible according to the laws of nature, and that which, in like manner, we must consider impossible.[66]

He refers to Black and his experiments in this thesis though does not name him when stating that calcareous earth and spar are saturated with fixed air. It is in his expanded *Theory of the Earth* (1795) that he makes the significant claims that link his theory with Black's discovery. For Hutton, the key agent for the gradual weathering and dissolution of mountains is water and he argues that his theory is unique: 'That no such theory as this, founded upon water as an agent operating in the changes of this earth, has yet appeared, will, I believe be easily allowed.'[67] When Joseph Banks visits Iceland he

[66]James Hutton, *Theory of the Earth. Investigation into Laws Observable in the Composition, Dissolution, and Restoration of Land upon the Globe* (Edinburgh: Creech, 1788), p. 15.
[67]James Hutton, *Theory of the Earth with Proofs and Illustrations* (Edinburgh: Cadell, Davies and Creech, 1795), p. 199.

returns with samples that he shares with both Hutton and Black, Hutton notes: 'Dr Black has been analysing the water' (Hutton, p. 314). It appears that the aid of chemistry is through Black. Hutton clearly draws on Black when he writes of limestone and solution in water: 'Calcareous bodies may be easily dissolved, and either carried away or dispersed in the mass' (Hutton, p. 227). They may be easily dissolved but not quickly as dissolution takes time and Hutton acknowledges this in his argument for the age of the earth and the pace of earth processes. Hutton makes the case for limestone solution:

> Calcareous matter, the great vinculum of many mineral bodies, is in a perpetual state of dissolution and decay, in every place where the influences of air and water may pervade. The general tendency of this is to dissolve calcareous matter out of the earth, and deliver that solution into the sea. (Hutton, p. 289)

Hutton does refer to mines that have speleothems in them formed by the infiltration of water: speleothems stained red with haematite and black with manganese. Hutton calls caves 'cavities' and focuses his text on the speleothems found in them, however, he does briefly discuss cave morphology:

> For it is upon the general solubility of calcareous matter exposed to water that those cavities are formed, in which may be found such collections of stalactical concretion; and the general tendency of those operations is to waste the calcareous bodies through which water percolates. (Hutton, p. 289)

Hutton's text is extremely general, there is no detail or evidence, no suggestion of having visited any caves. It appears that he has accepted Black's laboratory

experiments and applied the discoveries of fixed air and carbonic acid to limestone and caves generally. Hutton's *Theory of the Earth* does include detailed field descriptions, particularly of unconformities at Jedburgh, on the Isle of Arran and at St. Abb's Head, Siccar Point, though he does not extend his field excursions to caves.

Buckland argues that though the importance of Hutton's *Theory of the Earth* is evident now, this was not the case at the beginning of the nineteenth century: 'The form of the text and the form of the world it described were out of kilter. By the turn of the century, Hutton was dead and the theory was fading from memory' (Buckland, p. 36). John Playfair's revisionary book, *Illustrations of the Huttonian Theory of the Earth* (1802) attempted to renew the relevance of the theory. In so doing, Playfair recalled the importance of Black and Hutton's relationship and the role of limestone solution in Hutton's theory of gradual weathering and corrosion of rock:

> Some earths, again, such as calcareous, are immediately dissolved by water; and though the quantity so dissolved be extremely small, the operation, by being continually renewed, produces a slow but perpetual corrosion, by which the greatest rocks must in time be subdued.[68]

The process was incredibly slow and imperceptible and it needed time longer than the biblical chronology of earth history would allow. The key here was the evidence of Black's experiments, and those of Macbride and Cavendish, to establish this chemical process. Playfair acknowledges Black's role:

[68] John Playfair, *Illustrations of the Huttonian Theory of the Earth* (Edinburgh: Creech, 1802), p. 98.

> The discoveries of Dr Black, therefore, mark an era, before which men were not qualified to judge of the nature of the powers that had acted in the consolidation of mineral substances. These discoveries were, indeed, destined to produce a memorable change in Chemistry, and in all the branches of knowledge allied to it. (Playfair, p. 523)

Playfair argues that Black's discovery of the properties of carbonic gas (fixed air) and its relation to calcareous earth was an essential piece of evidence for Hutton's theory of weathering, erosion and corrosion. Hutton was sure such processes occurred but needed the proof that they did so, and Black provided it. Playfair wrote of Hutton and his reliance on Black:

> His active and penetrating genius soon perceived, in the experiments of his friend, the solution of those difficulties, and formed that happy combination of principles, which has enabled him to explain the most enigmatical appearances in the natural history of the earth. (Playfair, p. 524)

This is a remarkable statement from Playfair as it places limestone and the chemical process of its dissolution at the heart of Hutton's theory, though the detailed morphology of limestone caves remains absent from the description. Cave morphology, though implied, must be extrapolated from the statements both men make about calcareous earths. However, there exists an interesting note in Playfair's book. Sometime between Hutton's death in 1797 and the publication of the book in 1802, Playfair and Lord Webb Seymour visit Ingleton in Yorkshire looking for evidence of geological unconformities. They of course find the classic Palaeozoic unconformity at Thornton Force at the entrance to Kingsdale, the horizontal Carboniferous

limestone beds lying unconformably upon the upright Ordovician rocks below. They continue their search and find another example a mile and a half outside of Ingleton on the Askrigg Road, a short walk up the slopes of Ingleborough. The same unconformity is exposed at a cave entrance. Playfair does not give its name though it appears to be the old entrance to White Scar Cave, now a show cave with a much-enlarged entrance. This entrance is formed on the unconformity. Playfair does not enter the cave (it was first entered in the 1930s) but remarks on the very strong draught blowing out of it, out from 'the inmost recesses of Ingleborough' (Playfair, p. 217). Hutton's namesake, John Hutton, had by this time written his *A Tour to the Caves, in the Environs of Ingleborough and Settle* (1781) where he described the caves of Yorkshire as 'the hidden recesses of nature,' and had written of Ingleborough as being a 'monster of nature' carved out in all directions 'like a honeycomb' (Hutton, p. 35). It would appear that Playfair was interested in the phenomenon of the cave but was perhaps unwilling to 'displace' himself and cross the threshold.

Adam Walker and the Exploration of Caves.

Black's isolation and identification of fixed air (carbon dioxide) and acidic solution is a remarkable landmark in eighteenth-century chemistry and the quantitative method, along with the further developments of carbonaceous solution by Macbride and Cavendish. Hutton, as Black's friend and colleague, appears to be the first person to apply this discovery to the weathering and corrosion of rocks. It is this chemical evidence, Playfair argues, that underpins Hutton's theory of gradual erosion and corrosion of both the earth's subterranean and surface materials. Hutton was not alone in observing how rain water percolates through calcareous materials to form

soils; in 1778, John Whitehurst observed the layers of soil above the limestone in Derbyshire:

> The effects of the weather extend many feet below the surface of the earth. Immediately under the soil, the fragments of the stone are small, and gradually increase in bulk to the depth of fifteen or twenty feet, where the stratum generally becomes solid.[69]

Whitehurst made this acute field observation about soil horizons and the effect of weathering on the buried upper layer of limestone, now known as the epikarst. He observes the effect of chemical weathering though does not explain how the chemistry of the rainwater, having absorbed fixed air to create a weak carbonic acid, reacts with the limestone.

In acknowledging this relationship between chemistry and geology in the chemical weathering process, Playfair compares Hutton to Copernicus, as the geologist who has transformed perceptions of the earth. However, from the perspective of caves, Hutton writes very little. He states that 'cavities' are formed through carbonic acid and limestone dissolution though does not mention any specific caves. It appears to be a generic recognition of subterranean morphology whereas his theory devotes more attention to the erosion, corrosion and sedimentation of surface streams and rivers. While Hutton focused his attention to these fluvial processes, a rapidly increasing number of people were visiting and exploring caves and reporting morphological observations. They were interested in the variety of caves they found,

[69] John Whitehurst, *An Inquiry into the Original State and Formation of the Earth; Deduced from the Facts and Laws of Nature* (London: Cooper, 1778), p. 157.

which were formed either horizontally or vertically and contained an often-bewildering diversity of formations. One such cave explorer was the natural philosopher and engineer, Adam Walker who is perhaps the instrumental figure in the transfer and application of Black's chemistry to specific cave environments.

In 1766, the year that Cavendish published his experiments on fixed air and its solubility in water in *Philosophical Transactions*, and almost twenty years before Hutton's *Theory* was published, Walker published his book of lectures on natural philosophy: *A System of Familiar Philosophy in Twelve Lectures*. This book is remarkable in that it was published in twenty editions up to 1827. In the lecture on chemistry Walker wrote: 'calcareous earths are limestone, chalk, marble, stalactites, bones of animals, shells of fishes, and most earths that effervesce with acids […] Calcareous earth contains much fixed air.'[70] Walker was evidently familiar with the chemical discoveries of fixed air and calcareous substances of Black and Macbride, he also visited limestone caves in Ireland, Somerset, Derbyshire and Yorkshire, applying what experiments he could to the limestone he encountered. It was on a visit to Dunmore Cave, near Kilkenny in Ireland, in 1771, that Walker makes the first specific application of Black's and Cavendish's laboratory experiments with fixed air to a cave. In *Philosophical Transactions*, he writes:

> When I tried these petrifactions with an acid, the effervescence was excessive was excessive strong; and as the earth all round is calcareous, and the stones limestone, I humbly apprehend the icicle figures impending from the roof, and these knobs, are thus formed. The rains, that fall on the hill over this cavern,

[70] Adam Walker, *A System of Familiar Philosophy in Twelve Lectures* (London: Kearsley, 1799), p. 157.

> oozing through an okery calcareous earth, and the limestone roof, imbibe or dissolve their fine particles in their descent; and, as this mixture can only filter through the rock exceedingly slowly, the water hanging on the roof is soon dissolved by the air, and the stony particles are left behind.[71]

He makes the same observations when visiting Weathercote Cave in Chapel-le-dale, Yorkshire, in 1779: '(the limestone and fossils) effervesce with an acid […] by the discharge of their fixed air.'[72] Walker can see the effect of the acid and has a basic knowledge of fixed air though has yet no thorough understanding of how the chemical process works. Chemists, as Shaw states, did not yet fully understand the properties of carbon dioxide or oxygen and the properties of limestone were still not fully understood either. Humphry Davy would isolate the elements calcium and magnesium in 1808, and therefore the properties of limestone (calcium carbonate) and dolomite (calcium magnesium carbonate) were yet only partially known. However, chemists and geologists were acknowledging this discovery, incomplete though it was.

Chemist, William Nicholson was vague with this relationship when he wrote in 1781 that 'specimens of calcareous earth are very many. Limestone, chalk and many kinds of marble consist of this earth combined with aerial or some other acid.'[73] He was more precise in 1791 when he wrote:

---

[71] Adam Walker, 'A Letter to Charles Morton, MD. Secretary of the Royal society; containing an account of the Cavern of Dunmore park, near Kilkenny, in Ireland' *Philosophical Transactions* 63 (1773) p. 17. <http://rstl.royalsocietypublishing.org/content/63/16.full.pdf+html> [accessed 30 April 2018]

[72] Adam Walker, 'A description of some natural curiosities in the western edge of Yorkshire,' in Thomas West, *A Guide to the Lakes, in Cumberland, Westmoreland and Lancashire* (London: Richardson and Urquhart, 1780), p. 229.

[73] William Nicholson, *An Introduction to Natural Philosophy* (Philadelphia: Thomas Dobson, 1785), p. 417.

> The acid which is commonly known by the name of fixed air, abounds in great quantities in nature, and appears to be produced in a variety of circumstances […] Water, under the common pressure of the atmosphere, and at low temperature, absorbs somewhat more than its bulk of fixed air, and then constitutes a weak acid.[74]

Nicholson has clearly read Cavendish's paper on how water's temperature affects its ability to absorb fixed air, though the time lapse between these two chemists' writing suggests some uncertainty in the process. There evidently existed doubt as to the properties of the limestone being corroded as well. In the addenda of the third edition of Thomas West's *A Guide to the Lakes* (1784), John Hutton writes, in a footnote to his 'A Tour to the Caves', about the morphology of the caves he visits in Chapel-le-dale, interestingly the same ones as Adam Walker:

> Limestone has all the appearance of having been once in a soft state, and easily soluble in water. This principle will account for the scallops on the surface of limestone rocks, being made perhaps by the water draining off while the stone was soft; also for the chinks and crevices amongst them, made by their shrinking together when dried by the sun. The caves themselves proceed, most probably, from a great part of the rock being dissolved and washed down by the streams pervading the different strata.[75]

John Hutton exemplifies the benefit from visiting caves and observing the varied subterranean phenomena in person. He mentions the scallops formed on the walls of

[74] William Nicholson, *The First Principles of Chemistry* (London: Robinson, 1790), p.177.
[75] John Hutton, 'A Tour to the Caves' in Thomas West, *A Guide to the Lakes, in Cumberland, Westmoreland and Lancashire* (London: Richardson and Urquhart, 1783), p. 268

caves and the numerous cracks. James Hutton misses out on the details of cave structures that his namesake observes. However, unlike James Hutton, John Hutton still believed in the biblical chronology, he could not conceive of the time taken by the flow of phreatic water (the cave full of flowing water below the water table) to wear the scallops in the wall. Also, he cannot conceive of the time it would take to corrode the cracks (joints) he observes and so explains them through the drying action of the sun and being of a softer form of rock. Joints are now understood to have formed in the lithification process of the limestone and are invariably the weak points of the rock, the inception horizon, where the cave morphology begins. Hutton's observations are astute ones, though his understanding does not provide him with the geological time to think otherwise. He acknowledges this in his philosophical speculations in the independent edition of *A Tour to the Caves* in 1781:

> My theory is conformable to events, as related by *Moses*; and my reasoning agreeable to the philosophical principles of Sir *Isaac Newton*, where they could be introduced. Whatever is published to the world on the natural history of the surface and interior parts of the earth, that is inconsistent with either of their doctrines, will be of no benefit to mankind, and of short duration. (Hutton, *Tour*, p. 83)

James Hutton had concluded his 1785 edition of his *Theory of the Earth* with the now famous line about geological time and the gradual erosion and uplift of mountains: 'The result therefore, of our present enquiry is, that we find no vestige of a beginning, - and no prospect of an end.' This is a quotation that is still currently used by geologists to convey the enormity of geological time. Hutton employs the aesthetic concept of

the sublime to present this bewildering and unimaginable timescale. Chemist and geologist, Richard Kirwan took exception to Hutton's recalibration of the earth's age. Kirwan followed the interpretation of John Hutton when he wrote in his *Geological Essays*;

> Vast caverns are frequently formed in the interior of these mountains, or even in the plains whose substratum is calcareous rock; these evidently result from the erosion or solution of the softer calcareous particles by water.[76]

Kirwan cannot accept the geological time proposed by James Hutton, which was still largely perceived as Aristotelean 'eternalism.' Like John Hutton's interpretation, the rock that is corroded by acidic water is softer than the surrounding rock and has dissolved within the biblical chronology. Kirwan accepts the chemistry of fixed air and writes about it in his *Elements of Mineralogy* (1784) and *An Essay on the Analysis of Mineral Waters* (1799). He too conforms to both Moses and Newton, and, like John Hutton, dismisses theories that do not. He goes further with James Hutton and belatedly accuses him of atheism (Hutton died in 1797):

> Moreover, recent experience has shown that the obscurity in which philosophical knowledge of this state has hitherto been involved, has proven too favourable to the structure of various systems of atheism or infidelity, as these have been in their turn to turbulence and immorality, not to endeavour to dispel it by all the lights which modern geological researches have struck out. Thus, it will be found that geology naturally ripens, or (to use a

[76] Richard Kirwan, *Geological Essays* (London: Bremer, 1799), p. 230

> mineralogical expression) graduates into religion, as this does into morality. (Kirwan, *Geological Essays*, p. 2)

Kirwan, like Sneyd and Watson before him, cannot ignore what he perceives as an attack against his Christian beliefs, yet as a chemist he is at the forefront of advances in natural philosophy and science that will challenge the literal interpretations of the Bible. He already acknowledges this with his acceptance of the gradual formation of caves rather than the singular catastrophic event of the biblical flood. It is Playfair who is left to defend James Hutton's conception of geological time. It is not eternalism, he argues, Kirwan has misunderstood Hutton's statement:

> To assert, therefore, that, in the economy of the world, we see no mark, either of a beginning or an end, is very different from affirming, that the world has no beginning, and will have no end. The first is a conclusion justified by common sense, as well as sound philosophy, while the second is a presumptuous and unwarrantable assertion, for which no reason from experience or analogy can ever be assigned. (Playfair, p. 120)

Playfair's argument returns to the core belief of eighteenth-century natural philosophy, that you work from the phenomena or data that you have. The record of the rocks, especially the angular unconformities he and Hutton had examined, suggested a much greater length of time than that allowed by biblical chronology though they did not yet have the capacity to measure this time. Hutton had written: 'Reason without data is nothing but delusion,' and Macbride reminded his readers of Newton's assertion concerning the purpose of science, using it as an epigraph in his collection of experimental essays: 'The main business of natural philosophy is to argue

from phenomena, without feigning hypotheses' (*Opticks*, Bk. 3, Q. 28). Playfair challenges Kirwan's belief, his faith, by asserting that the age of the earth cannot yet be known. The vast amount of time required for chemical weathering, corrosion and dissolution, for transport and sedimentation, and for more erosion to occur, as evident in unconformities, is far too great to quantify.

Charles Lyell and the Formation of Caves.

Eighteenth-century geologists still believed in God and a considerable number still believed in catastrophism, and, as Rudwick has noted, many oscillated from one position to the other, never feeling it was necessary to commit to either stance, or theory, when carrying out their research. This point is stressed by Playfair in the conclusion of his book about Hutton's theory. Playfair argued that the problem with the theories of Burnet, Whiston and Woodward, is that they aimed to explain the origin of all things and in so doing laid themselves open to criticism from every new discovery in geology that contradicted them; such theories become incapable of proof. Hutton's theory is different in that it avoids any attempt at such an explanation; Hutton aims to discover 'the laws that regulate the changes on the surface, or in the interior of the globe' (Playfair, p. 511). This brings the subject very practically into the realm of observation, and though geology is a science still in its infancy, compared to astronomy and mathematics for example, new discoveries are providing ever more evidence for Hutton's theory. As Playfair has argued, the key evidence was that provided by Black's discovery of fixed air and its properties. Playfair engages with the concept of revolutionary change himself; theories of the earth, he argues,

> are steps in the advancement of knowledge, and are terms of a series that must end when the real laws of nature are discovered. It is on this account, rash to conclude, that in the revolutions of science, what has happened must continue to happen, and

> because systems have changed rapidly in time past, that they must necessarily do so in time to come. (Playfair, p. 512)

From a cave science perspective, the work of Hutton and Kirwan, and other European chemists did bring about a substantial shift, or step, and break from the biblical theories in the way cave formation was perceived. Lyell makes the clearest expression about the relationship between chemistry and cave science when he writes about the example of the Yorkshire caves and the growth of stalactites and stalagmites and other calcareous precipitates:

> To the solvent power of water, surcharged with carbonic acid, and percolating various winding rents and fissures, we may ascribe those innumerable subterraneous cavities and winding passages which traverse the limestone in our own and many other countries. (Lyell, p. 211)

The place and manner of limestone formation, its movement from sea bed to land surface, its subjection to chemical and mechanical erosion, make it a unique rock type that undergoes very specific transformations that isolate it from the generalities of the biblical theories. Lyell stresses this geological uniqueness and the importance of the relationship between the rock and carbonic acid:

> It rarely happens, except in limestone rocks, that the carbonic acid can dissolve all the constituent parts of the mass; and for this reason, probably, calcareous rocks are almost the only ones in which great caverns and long winding passages are found. (Lyell, p. 217)

This must be understood as a revolution, a major step or turning point in the understanding of caves. However, would that it was so simple. Rudwick argues that many of the geologists at this time were active and pious members of the church though they did not believe in the literal interpretation of the Bible. He writes:

> Such interpretations remained an optional extra for the scientific geologists of the early nineteenth century. Those who were religious believers sensed no incompatibility or even strain between their scientific and religious activities.[77]

The revolutionary shift apparent in the understanding and acceptance of limestone solution could still be assimilated into the biblical theories of the earth. William Buckland's study of archaeological remains in caves, primarily in Kirkdale Cave in Yorkshire though also in numerous caves in Germany, published in 1823, was presented as an argument for the catastrophe of the 'universal deluge.'[78] Buckland uses a meticulous scientific discourse throughout and, though he argues in favour of the catastrophist flood theory, he does not for a moment suggest the flood waters broke through the surface forming caves as conduits. The caves were there before the flood and preserved the remains of the animals killed in it:

> Thus the phenomena of this cave seem referable to a period immediately antecedent to the last inundation of the earth, and in which the earth was inhabited by land animals, almost all bearing a generic and many a specific resemblance to those which now exist; but so completely has the violence of that tremendous convulsion destroyed and remodelled the form of the antediluvian surface, that it is only in the caverns that have been protected from its ravages that we may hope to find undisturbed evidence of events in the period immediately preceding it. (Buckland, p. 42)

It appears here that the biblical theories have assimilated the new geology. The cave existed before the flood and the evidence is in the remains of the animals found; how else could they have got there? Buckland appears to have no conflict with modern geology, and indeed

[77] Martin Rudwick, *The Great Devonian Controversy: The Shaping of Scientific Knowledge among Gentlemanly Specialists* (Chicago: University of Chicago Press, 1988), p. 45.
[78] William Buckland, *Reliquiae Diluvianae, or, Observations on the Organic Remains Contained in Caves, Fissures, and Diluvial Gravel, and on other Geological Phenomena, Attesting the Action of an Universal Deluge* (London: John Murray, 1823).

probably fully accepts that the caves were formed through the chemical process of limestone solution.

Another geologist responsible for transforming the understanding of caves was the engineer and map-maker, William Smith. If, as is evident in the following chapters, guide book writers enabled the mobilisation of limestone and cave knowledge, it was map-makers like Smith who made their contribution possible. His geological map, published in 1815, was the culmination of all his canal engineering profession and geological inquires; it analysed, edited and collated a vast quantity of material and presented it as a practical resource.[79] Smith stressed the importance of subterranean hydrology in the drawing of the map:

> Tracing the courses of springs beneath the surface will show the best methods of draining and improving land; and the collecting of water from those natural subterraneous reservoirs, the caverns of hills and joints of rocks, for the supply of canals.[80]

In the memoir to the map, Smith identifies and locates the countries limestone regions: Derbyshire, Yorkshire, Cumberland and Westmorland, Somerset, North and South Wales. He presents the case of fossils found in raised strata that were formed on the sea bed, layered between strata of terrestrial rocks, 'The purposes to which many of them may be applied, are doubtless still unknown' (Smith, p. 4). Here Smith is applying elements of the emerging science, while at the same time establishing the foundations with the essential contribution of his map. However, like Lyell and Buckland, he adheres to the governance of the earth by its 'great Creator,' though does not read the scriptures as literal truth (Smith, p. 3). Smith and

[79] William Smith, *A Delineation of the Strata of England and Wales with Part of Scotland; Exhibiting the Collieries and Mines, the Marshes and Fen Lands Originally Overflowed by the Sea, and the Varieties of Soil According to the Variations in the Substrata.* (Facsimile printed by the British Geological Survey, 2015).
[80] William Smith, *A Memoir to the Map and Delineation of the Strata of England and Wales, with part of Scotland* (London: John Cary, 1815), p. 5.

Buckland made important contributions to the new science though it was Lyell that brought all the parts, all the mobile resources, together. The vast collections of data made by Woodward, Hutchinson and Hutton would be meaningless unless someone like Playfair or Lyell attached them to a specific coherent context. The first publication of the newly formed Geological Society in 1808, *Geological Inquiries*, included five pages of questions that a disciplined and attentive geologist should ask themselves when out in the field. It also stated its reliance on other branches of natural science, especially chemistry, 'which investigates the intimate nature of matter and its hidden properties.'[81]

Conclusion.

It is evident that a major transformation has taken place in natural philosophy to create the science of geology. This change is inseparable from the neglected role played by the discovery of corrosive weathering, the dissolution of limestone and carbonaceous rocks and the formation of caves. This change and inception has come about through a number of factors: the growth in the number of fieldworkers recording data, the cooperation of branches of natural philosophy, chemistry and geology for example, the application of laboratory experiments to the field, the greater extent of intertextuality through the expansion of publishing and the mobility of information, the division of historical time and geological time, the understanding of gradual natural processes and the production of geological maps that identify field areas of limestone and caves. As geology has started to become a specialised branch of science, the study of caves has started to become a branch of geology. The role of water has been fundamental in the thinking behind cave morphology, it is how the water erodes and corrodes the rock that has been the crucial discovery. What is made clear in Lyell's *Principles of Geology* is the fundamental importance of the nascent comprehension of

[81] C. Lewis and S Knell (eds), *The Making of the Geological Society of London* (London: The Geological Society, 2009), pp. 449 – 456, p. 449.

limestone solution. This discovery shows us that caves are not the product of a single catastrophe but, rather, are still in the process of being formed and extended, and do so through many interactions within the earth and with the wider environment above it.

Geologists arrived at this understanding after a century of debate concerning the agency of God or of nature. It is evident that while many disagreed with Spinoza's equivalence of God and nature, others in practice embraced it completely, others quietly accepted it while at the same time writing in rejection of it and others ignored the debate altogether. Many of these philosophers perceived nature as an entity, an elusive entity that hides its essence or its secrets. Those who could search them out and discover them were the bold, curious and speculative philosophers; those not afraid to challenge orthodox thinking.

Such a search had its equivalence in the classical descent narrative and the pursuit of concealed wisdom. The role of the imagination during this period of scientific breakthroughs has not only been to aid thought and reason but to enable the expression of the very process of discovery. In the development of cave science in the long eighteenth century, the imagination and its classical influences exist as a major element of its discourse.

Chapter Two: Cave Myth and Literature

Introduction: The Descent Narrative, Underworld and Hell.

In this chapter, I will explore the changing cultural perceptions of caves in fiction through the motif of the descent narrative and the development of the aesthetic of the sublime. The inclusion of descent narratives in the fiction of the eighteenth century has been critically overlooked. This chapter will address the place of the descent narrative as a new genre in both familiar and unfamiliar poems and novels. Though the descent narrative has a history dating back at least four thousand years, it was transformed in the eighteenth century through its development with the aesthetic of the sublime, the increasing popularity of the blank verse narrative poem, the hybrid genre of travel writing, the development of the novel and, perhaps most transformative of all, the experience of descending and exploring real caves and traversing subterranean topography. Poetry and prose fiction are clearly an essential element in the transformation of perceptions of nature, what Nicolson has called 'the most profound revolution in thought that has ever occurred.'[1] This revolutionary change in perceptions is evident in the developments of natural philosophy and science, explored in Chapter One. The topography used in the eighteenth-century descent narratives is based on the observations of real caves rather than the generalized, allegorical topography of the earlier narratives. Embedded within the newly observed and sublime topography, the hero or demi-god of the mythic descent gives way to the eighteenth-century every-man and woman. Farmers and miners acted as guides for tourists and independent travellers. The popularity of visiting caves and experiencing the physical descent increased considerably through this period with the rise in domestic travel and tourism this will be examined in the following chapter. This rise in the

[1] Marjorie Hope Nicolson, *Mountain Gloom and Mountain Glory. The Development of the Aesthetic of the Infinite* (Seattle: University of Washington Press, 1959; repr. 1997), p. 3.

number of visitors brought the cave to prominence as the subject of place poems, a form of poetry that already included mountains, rivers and parkland.

In this first section I will consider to the role the underworld has in our imagination and to a range of examples of the mythic treatment of hell, which I will then explore in greater detail with what follows. The underworld is an imagined place of the dead, the place of Hades, Pluto, Tartarus or Hell. In ancient cultures, for example Greek culture, it had locations, often geographically precise, with entrances, rivers, gateways, paths and numerous levels. Despite its supposed geography, the underworld is also a psychological state, a state of mind, allied to thoughts of death. Of this relationship, psychologist James Hillman argues: 'Mythology is the psychology of antiquity. Psychology is a mythology of modernity.'[2] This understanding and expression of what the underworld meant was an important part of landscape poetry during the eighteenth century, as developments in geological knowledge and the effect of the aesthetic of the sublime raised doubts in the faith of Christians. The location and accessibility of hell was still an issue among believers. The greater the inaccessibility to the underworld, the more likely such a place was to generate narratives of descent and return, a chance to cheat death, if only temporarily, and discover the ultimate knowledge of life. The descent narratives from ancient Greek, classical Latin, medieval and early modern literature are many, and the eighteenth century maintained the tradition. Rachel Falconer describes the descent narrative in the Western imaginative tradition:

> Even more important than the notion of Hell as a sacred space is our belief in the journey through Hell, the idea of the transformative passage, the destruction and rebirth of the self through an encounter with the absolute Other. The arc of such a journey only becomes visible retrospectively, when remembered and narrated. […]

[2] James Hillman, *The Dream and the Underworld* (New York: Harper, 1979), p. 23.

> While Hell as a space remains unfathomable, we invest the narrative of the journey through Hell with potent meaning.[3]

The person who could embark upon such a journey and return was always a chosen one, either hero or demi-god with special dispensation, such as Odysseus, Aeneas, Beowulf, Dante or Satan. Any such katabatic proponents had not only to be chosen but initiated, and one such form was that of the Eleusinian Mysteries associated with Aeneas. Eighteenth-century scholar, Thomas Taylor explored the origins of this initiation process further in his dissertation on the Eleusinian and Bacchic Mysteries (1790).[4] Taylor quotes Virgil through Dryden's translation, on the initiate's 'Task and mighty Labour' in returning to the surface. For Taylor, this is the struggle to separate the soul from the body; to achieve this the soul must descend into oblivion and the profound material darkness of Hades. The journey was a rite of passage with the underworld as the most alien of places, a 'displacement,' a place where none of the familiar or common conditions exist.

Maud Bodkin perceives Aeneas and the Eleusinian mysteries from a psychological perspective:

> Before any great task that begins a new life and calls upon untried resources of character, the need seems to arise for some introversion of the mind upon itself and upon its past – a plunging into the depths, to gain knowledge and power over self and destiny.[5]

Such a perspective gained traction in the eighteenth century as the descent narrative became the journey of ordinary people, with no requirement to be either chosen or initiated. As

[3] Rachel Falconer, *Hell in Contemporary Literature. Western Descent Narratives since 1945* (Edinburgh: Edinburgh University Press, 2007), p. 1.
[4] Thomas Taylor *The Eleusinian and Bacchic Mysteries: A Dissertation* (New York; Bouton, 1891), p. 52.
[5] Maud Bodkin *Archetypal Patterns in Poetry: Psychological Studies of Imagination* (London: Oxford University Press, 1934), p. 124.

Falconer has pointed out, the descent narrative marked a transformative passage in the descender's life, a marker of a struggle with the self. Jon Mills, writes:

> At once the underworld remains hidden, yet it conditions the earthly social structures that guide human engagement and cultural practices. Here, the underworld becomes the bedrock of earth and sky, of flesh and spirit, what might not be inappropriately analogous to the human psyche in its struggle with bodily desires, social relations, irrationality and the pursuit of value.[6]

Mills addresses the shared psychological experience of the underworld, which in the eighteenth century breaks free from the archetypal character of the hero and embraces the struggles of the everyman.

In the eighteenth century, descents into the underworld, to penetrate the hidden recesses of nature, were also essential metaphors for natural philosophers and early scientists in pursuit of the life and earth processes. Unlike any other real and imaginative environment, literature and science merged in scientific explorations of the underground, where both causal and aesthetic processes were of interest. The aesthetic engagement relied on the emotions of cave visitors and so increasingly psychological responses became evident in his or her writing. Here, interest in the processes of unconsciousness, or subconsciousness as it would become more aptly known as, started to appear. Hades was both god and place, and is understood to mean 'hidden,' both figuratively and spatially. Hades, or the underground, was where nature was concealed. In this context, Mills considers the ancient Greek word for truth, *aletheia*. He perceives the meaning, that which simultaneously reveals and conceals, to correspond with consciousness and subconscious processes. Drawing attention to the River Lethe in Greek mythology, the river of forgetfulness, Mills shows that *a-letheia* is its reversal,

[6] Jon Mills, *Underworlds. Philosophies of the Unconscious from Psychoanalysis to Metaphysics* (London: Routledge, 2014), p. 5.

that which is forgotten is 'unforgotten,' that which is hidden is disclosed, or unconcealed. A descent into the underworld is a deep and revealing though disorientating experience:

> With every disclosure, there is also simultaneously a closing, a covering-over, for truth may only be shown in its passing over from concealment. This process of uncovering in the presence of covering is its double truth. (Mills, p. 7)

The epigraph in Mills' book is aptly from the pre-Socratic Greek philosopher, Democritus: 'In reality we know nothing – for truth lies in the depths.' A descent into the underworld and the underground, in pursuit of truth, where it is revealed while being simultaneously concealed provides an insight into the way perceptions of the underground were transformed.

The concealed space of the underground coincides with that of the sublime, though as Radcliffe Edmonds points out there is a practical problem in accessing this space, 'The first obstacle that the traveller could possibly face on the journey from the land of the living to the realm of the dead is a difficulty in departing from the world of the living.'[7] Caves of material reality, or those of the mind, lie beyond familiar experiences and perceptions. In considering why the underground was such an adequate location for the underworld, classical scholar, Yulia Ustinova, describes how the neurological processes of the human brain can produce sensations of breathlessness, weightlessness, blurred or diminished vision, the hearing of unfamiliar sounds and disorientation when descending into a dark, labyrinthine cave. With this near hallucinatory tunnel vision, the descender could experience something akin to another reality, like being channelled through a vortex. Due to this type of experience, natural cave features were identified as entrances into the underworld, 'spiritual experiences were

[7] Radcliffe Edmonds, *Myths of the Underworld Journey* (Cambridge: Cambridge University Press, 2004), p. 223.

accorded topographic reality.'[8] David Lewis-Williams, when discussing Palaeolithic cave paintings, writes:

> Entry into Upper Palaeolithic caves was probably seen as virtually indistinguishable from entry into the mental vortex that leads to the experiences and hallucinations of deep trance. The subterranean passages and chambers were the 'entrails' of the nether world; entry into them was both physical and psychic entry into the underworld.[9]

Both Ustinova and Lewis-Williams describe the sensory deprivation and intensification experienced in caves, in the privation of darkness, silence and isolation, properties of the sublime identified by Burke. Philosopher, Maurice Merleau-Ponty, argues that our spatial perspective of an object determines our experience of it, and that movement changes our position and relationship with the object. Our spatial position is an embodied one, 'I consider my body, which is my point of view upon the world, as one of the objects of that world.'[10] The observer of the cave space affects the space by his or her presence, essentially by introducing light to a space that contains no source of it. Also, the human body must negotiate a passage and spatial perspective in the confines of the cave. Such a traveller underground would be displaced; he or she would move from a known place into a dark absence of place. This rapid displacement and transformation could leave the traveller in a state of disorientation and fear with their deprived yet intensified senses in a state of bewilderment, and thus defy any attempt to apply reason. The darkness would limit or challenge their empirical observations. In this case, the underground initiates emotional responses to nature, encouraging aesthetic judgments, highlighting the way the mind, and subsequently language, is affected by the

[8] Yulia Ustinova, *Caves and the Ancient Greek Mind: Descending Underground in Search for the Ultimate Truth* (Oxford: Oxford University Press, 2009), p. 31.
[9] David Lewis-Williams, *The Mind in the Cave. Consciousness and the Origins of Art* (London: Thames and Hudson, 2002), p. 209.
[10] Maurice Merleau-Ponty, *Phenomenology of Perception,* trans. by D. A. Landes (London: Routledge, 2012), p. 73.

experience of such environments. The experience can be uncanny. The sublime, a word originating from Latin meaning 'below the threshold,' could be the geographic phenomena, the response to it or the rhetorical methods used to convey either. The word is not included for the sole use of the descent narrative though it is a most apt one in the circumstances. The sublime is overwhelming, beyond reason, and it can be either material or imagined, the underground or the underworld.

The Western Christian culture had adopted and adapted the classical underworld into Hell, an after-life place not just of death, but sinful death and punishment. Hell, too was located underground, in the dark and inaccessible places of the earth. The eighteenth century not only saw the development of the underworld as a metaphor of psychological, aesthetic and scientific insight, it saw the struggle to detach Hell as a physical location from the earth. These debates added to the instability of underground and underworld perceptions. William Whiston argued that the earth would become Hell when God instigates the final conflagration, it will at this point merge with a comet. Tobias Swinden (1726)[11] and George Craighead (1748)[12] both argued that Hell could not be in the earth as there would be no room for all the dead and not enough air and fuel to keep the fires burning for eternity, and Hell had been created to confine the fallen angels after the revolt in heaven. The location of Hell could not be in the earth. Their place for Hell was within the confines of the Sun, with the sun-spots being the gateways to the eternal fires. Craighead also challenged what he saw as the heretical and atheist views of Abraham Oakes (1740)[13] and Charles Povey (1740),[14] who both argued that hell had no place at all but was a state of mind borne by the disembodied spirit after death. Oakes argues that the wicked 'carry Hell about with them' (Oakes, p. 36); an

[11]Tobias Swinden *The Nature and Place of Hell* (London: 1726).
[12] George Craighead *The Nature and Place of Hell Discovered* (Edinburgh: Gideon Crawford, 1748).
[13] Abraham Oakes, *The Doctrine of Hell Torments, Distinctly and Impartially Discussed* (London: Noon, 1740).
[14] Charles Povey, *The Torments after Death* (London: Roberts, 1742).

interpretation also conveyed by Marlowe's Mephistopheles and Milton's Satan. Displaced as it was, this spiritual Hell still sustained the crucial elements of the underworld: darkness and depth. Povey refers to 'the abyss of Darkness,' 'the unseen Prison of thick Darkness,' and 'the deepest Hell' (Povey, p. 11). In this interpretation, hell is a limitless space which has no dimension but depth, no light, no colour, no texture and no points of reference, a vortex perhaps. Povey writes that hell is 'in all places where God is absent' (Povey, p.10). Perhaps this state is best described by sixteenth-century poet, John Donne as 'absence, darkness, death; things which are not.'[15] Here the self or soul plunges in disorientation, out of time and place, in a state of sensory deprivation, aware only of falling.

Defoe, in his *The Political History of the Devil*, found the concept or belief in the location of hell to be nonsense:

> These things [the torments of hell], however intended for terror, are indeed so ridiculous, that the Devil himself to be sure, mocks at them, and a man of sense can hardly refrain doing the like, only I avoid it, because I would not give offence to weaker heads.[16]

Motivated by empiricism and a desire to understand the natural world, writers imagined the reverse of this dark, unfathomable space and desired to see all that was out of sight in its entirety. Thomas Burnet in his *A Sacred Theory of the Earth* writes, 'We must take off the cover of all Subterraneous places and deep Caverns, to see the inside of the Earth; and lay bare the roots of Mountains, to look into those holes and Vaults that are under them.'[17] James Thomson, a reader of Burnet, expressed a similar view in his poem *The Seasons* in 1746:

---

[15] John Donne, 'A nocturnall upon St Lucies day, Being the shortest day' in *The Complete English Poems* (London, Everyman, 1991).
[16] Daniel Defoe, *The History of the Devil, Ancient and Modern in Two Parts* (London: Kelly, 1726; repr. 1819), p. 232.
[17] Thomas Burnet, *A Sacred Theory of the Earth* (London: Centaur, 1691, repr. 1965), p. 121.

> Oh! Lay the mountain bare, and wide display
>
> Their hidden structure to the astonished view!
>
> Bid Atlas, propping heaven, as poets feign,
>
> His subterraneous wonders spread! Unveil
>
> The miny caverns. (Autumn, 779)[18]

Here lay the urge to reveal that which was hidden and concealed below; it was wishful thinking, a wish to avoid the trauma and struggle of the descent. Unless people made a conscious decision to enter or descend caves, they were out of sight, yet the concept of the descent narrative and the underworld, whether real or imagined, ensured they were never far from thought.

Thomas Burnet and the Sublime Underworld.

As is evident from Chapter One, Thomas Burnet was a central figure in starting the transformation of geological knowledge and perceptions of landscape. In his descriptions of landscape, and particularly of caves, and before the theories of the sublime were articulated in the eighteenth century, Burnet effectively presented the experience of landscape. Without it being named as such, Burnet's *Sacred Theory of the Earth* was an example of the rhetorical sublime; he described the experience of the natural sublime and the bewilderment of the mind, and finished by attributing all to the divine power of God. His rhetorical use of language was perceived as poetic though in prose, which, given the content, was perceived by some as far too persuasive and misleading. However, over a century after it was written, Coleridge wrote, 'Burnet's Theory of the Earth furnishes undeniable proofs that poetry of the highest kind may exist without metre, and even without the contradistinguishing features of a

[18] James Thomson, 'The Seasons' in *Poetical Works* (Oxford: Oxford University Press, 1908).

poem.'[19] Along with this engagement of the sublime aesthetic, this book was also the catalyst for the development of natural philosophy and earth science. Nicolson acknowledges this dual role in Burnet's writing: 'As in his science and theology, so in his aesthetic response to the vast and grand in external nature' (Nicholson, p. 207). She argues that Burnet had grown up in Britain with a sense of the orderly decorum of the natural world, though a three-year tour of Europe, with a crossing of the Alps and the Apennines and seeing the mountains closely, had radically transformed his view. In this environment, he saw chaos and disorder standing in marked contrast to the order he was familiar with; Nicolson writes: 'Wherever we look among his passages on wild nature, we find conflict between intellectual condemnation of asymmetry and emotional response to the attraction of the vast' (Nicholson, p. 207). Burnet sees the mountains and caves as ruins of a fallen world; his use of mountains has been well documented by Nicolson but it is his aesthetic use of caves, I would argue, that best exemplifies his approach to the sublime.

Burnet describes caves as ruins through a series of binary oppositions and an assemblage of features, 'For there is no sort of Cavities, interior or exterior, great or little, open or shut, wet or dry, of what form or fashion soever, but we might reasonably expect them in a ruine of nature' (Burnet, p. 101). He further uses this accumulative style with names of subterranean frames when viewing them as labyrinthine places to be approached with trepidation: 'Burrows, and Chanels, and Clefts, and Caverns, that never had the comfort of one beam of light since the great fall of the Earth […] We do not know when and where we stand upon good ground' (Burnet, p. 96). Burnet draws distinctions between his rational opinions and his 'inclination' or emotional opinions, and as such introduces the broad concept of the sublime. He was attempting to show how the Bible, and Genesis, could be understood from a rational and empirical perspective though in venturing out into the mountains and

[19] Samuel Taylor Coleridge, *Biographia Literaria* (London: Everyman, 1906), p. 151.

caves to do so, he could not avoid the faculty of imagination. When peering into the unknown depths of caves and the ocean abyss, he writes, 'This would effectually waken our imagination, and make us inquire and wonder how such a thing came in Nature' (Burnet, p. 104). For Burnet, it is the imagination that motivates reason and the pursuit of knowledge.

Burnet conveys the unease of crossing the threshold into the underground, into the obscure, concealed and unimaginably vast, 'Caves and Dens and hollow passages' that are 'endless and bottomless.' Though concealed from view, he stresses their potential, and unsettling, proximity, 'These subterraneous Rivers that emerge again, show us that the holes of the Earth are longer and reach farther than we imagine, and if we could see into the ground, as we ride or walk, we should be affrighted to see so often Waters and Caverns under us' (Burnet, p. 94). The imagination generates fear and apprehension of the underground as the natural object itself lies, for most, beyond experience; here this environment is understandably close to mythic notions of the underworld, equally beyond experience. Burnet, though aware of the awesome power of this environment, was clear in making his distinction:

> Places that are strange and solemn strike an awe into us, and incline us to superstitious timidity and veneration, and therefore they thought them (caves) fit for the seats and residences of their Deities. […] But all these uses and employments are now in a great measure worn out. (Burnet, p. 94)

The underground is a vast, obscure natural phenomenon, the thought of which strikes the spectator with fear and awe, though it is not the home of the gods. The distinction is made though Burnet uses the mythic descent narrative as a frame for his pursuit of knowledge.

Burnet writes about caves with rhetorical formality and with no evidence that he descended them, however, so important were they to him in, he makes use of the figurative descent narrative to account for his inquiry into formation of earth. In his conclusion, he writes

concerning the interpretation of scripture through empiricism and reason: ‘’Tis like entering into the mouth of a Cave, we are not willing to venture further than the light goes.’ However, at the start of the text when considering the task ahead, he writes:

> We must often tread unbeaten paths, and make a way where we do not find one; but it shall be with a light in our hand, that we may see our steps, and those that follow us may not follow us blindly. […] There is nothing so secret that shall not be brought to light. (Burnet, p. 24)

He uses the topographic metaphors of caves, paths, ways and steps, along with sensory metaphors of sight and blindness, light and dark. This is a key founding text for both the scientific and imaginative perception of caves at the beginning of the long eighteenth century, an initial ‘tread upon unbeaten paths,’ and is generalized, formulaic and rhetorical throughout; cave space is, like John Locke’s ‘blank slate,’ empty and awaiting impressions.

The Subterranean Sublime in Descent Poetry.

The poet, James Thomson, writes about the origin or source of natural phenomena that is concealed from view in his poem *The Seasons*. This is an example of the underground being out of sight, yet identified by way of its interconnects with other phenomena, in this case with the streams that flow from the base of mountains. Throughout the poem, Thomson pursues an empirical approach to the discovery of nature, though it is the sense of vision he commonly applies. He is aware of the underground though cannot see it. In the section, ‘Autumn,’ he writes about the source of spring water, the source of life:

> Say, then, where lurk the vast eternal springs
>
> That, like creating Nature, lie concealed
>
> From mortal eye, yet with their lavish stores
>
> Refresh the globe and all its joyous tribes? (773 – 6)

The observation he seeks is concealed, with a suggestion here of an immortal underworld where it may be revealed, and rather than a physical or even imagined descent experience, he follows Burnet in imagining the hidden recesses of nature discovered and illuminated. It is the frustrated desire to see the whole unified system as one, not fragments of it. He wants knowledge of 'the secrets of the dark abyss' (778). In an imagined act of omnipotent natural philosophy, he bids the earth, 'Oh! Lay the mountains bare, and wide display / Their hidden structure to the astonished view' (779 – 80). Thomson is aware of the scale of the system and its essential obscurity, and knows that it is impossible to comprehend it in anything other than localised segments; hence the 'astonishment' at the thought of seeing it.

Thomson's curious though detached perspective presents the objects of nature through the rhetorical and poetic sublime; he has mountainous surfaces from the Alps, through the Caucasus, the Andes and to Antarctica unfold 'their 'hideous deeps' (806). The accumulation of mountains is intensified by the spatial adjectives he applies to them, 'branching,' 'huge,' 'high,' 'farthest,' 'lofty,' 'wild,' 'wide,' and amid this cataclysmic upheaval, he presents his exclamatory vision:

> Amazing scene! Behold! The glooms disclose!
>
> I see the rivers in their infant beds!
>
> Deep, deep I hear them labouring to get free!
>
> I see the leaning strata, artful ranged;
>
> The gaping fissures, to receive the rains,
>
> The melting snows, and ever dripping fogs. (807 – 12)

Here, Thomson again perceives the underground through its interactions with other natural phenomena and processes. He includes further description of the interrelated beds of earth,

rocks, and the drains, siphons and reservoirs (permeable chalk confined by impermeable clay) 'united' with the heat of the sun, the clouds of the air in continuous fresh water cycles, which draw downpours of rain. His vision is of an interdependent world of processes, of material relationships, 'social commerce' and 'the harmony of things.' Perhaps this is a nascent view of what is currently termed ecology, as he was reading the work of the natural philosophers, such as Burnet, and was clearly interested in a deist approach to nature, where the work of God could be 'read' in place of scripture. The underworld is not the place of death, eternal despair and torment, but in this enlightened eighteenth-century world, it has been inverted and is now the source of life.

However, the contingency of life and the hidden depths remain the reality. When snow falls and darkness intensifies of the storm, Thomson's 'swain' in his struggle to get home across the trackless wilderness, finds himself in a sublime landscape, and equally sublime state of mind, that threatens to annihilate him:

> While round him night resistless closes fast,
>
> And every tempest, howling o'er his head,
>
> Renders the savage wilderness more wild.
>
> Then throng the busy shapes into his mind
>
> Of covered pits, unfathomably deep,
>
> A dire descent! (294 – 99)

What threatens to overwhelm him is what he usually can see and avoid, the open shafts of caves, or potholes, which are now covered with blown snow, thin layers that will easily collapse under his weight. It is the sudden opening of the surface, the blind fall into darkness, the plunging experience of a single dimension, that of depth, that strikes apprehension into

his thoughts. The underground may be out of sight, but, as Thomson illustrates, it is never far away or entirely out of mind.

Thomson's friend and collaborator, David Mallet, wrote a similar, though shorter poem that presented a view of the earth that owed much to the natural philosophers of the time: Burnet, Woodward, Hutchinson and Ray. In the poem, 'The Excursion' (1728),[20] Mallet uses his imagination alongside his knowledge of earth processes: 'Imagination travels with quick eye' (I, 369); both are intensified by his use of the rhetorical sublime and the grand set-piece of the poem in Canto I, the earthquake and volcanic eruption caused by the unknown forces of the subterranean earth. As with Thomson, Mallet perceives subterranean systems only through interactions with visible phenomena.

The narrator imagines the earthquake beginning and shaking the surface of the earth from deep below it, presenting then one of the prime images of sublime terror, already suggested by Burnet and Thomson that the underworld is always closer than you suspect: the ground beneath the feet of unsuspecting people suddenly opens and reveals the depth and darkness below:

> Sight full of fate! Up from the centre torn
>
> The ground yawns horrible a hundred mouths,
>
> Flashing pale flames – down through the gulfs profound,
>
> Screaming, whole crowds of ev'ry age and rank,
>
> With hands to heav'n rais'd high imploring aid,
>
> Prone to th' abyss descend, and o'er their heads
>
> Earth shuts her pond'rous jaws. (441- 7)

[20] David Mallet, *The Poetical Works* (Edinburgh: Apollo Press, 1780), p. 29.

Mallet presents the earth through a fusion of geography and anthropomorphism, fissures opening like jaws, and suggests that the fallen 'lost in night' and will not return. There is no anabatic climb back to the surface, no reflected narrative of visions of the underworld. However, Mallet does have some of the fallen return via subterranean rivers which carry them back to the surface:

> Borne thro' the darkness of the infernal world,
>
> Far distant rise, emerging with the flood,
>
> Pale as ascending ghosts cast back to day,
>
> A shuddering band! (449 – 52)

Their remarkable salvation is short lived; what they have seen and experienced in the underworld has driven them mad: staring wildly, they gasp for air and try to grasp anything to haul themselves from the flood waters but to no avail. Thomson's view of the underground was a fantasy, and Mallet's voyagers have returned insane, unable to narrate their story.

The concept of the descent narrative as part of an individual's wider personal struggle finds expression in a poem by another of Thomson's collaborators, Richard Savage. Savage imagines what it takes to descend and see the hidden recesses of nature, and return in his poem, 'The Wanderer. A Vision' (1729).[21] The narrator, the exiled wanderer of the poem's title, is like the narrator of Thomson's *The Seasons* and Mallet's 'The Excursion' presenting a view or survey of the natural world, through contemplation in seclusion. In searching for a place of seclusion to imagine exploring the remote and distant world, and 'the Course of Things' (Savage, p. 2), the interactions of natural phenomena, he falls upon a cave concealed beneath some trees:

[21] Richard Savage, *The Wanderer. A Vision: A Poem in Five Cantos* (London: Walthoe, 1729).

Beneath appears a Place, all outward bare,

Inward the dreary Mansion of Despair!

The Water of the Mountain-Road, half stray'd,

Breaks o'er it wild, and falls a brown Cascade.

Has Nature this rough, naked Piece design'd,

To hold Inhabitant of mortal Kind?

She has. Approach'd, appears a deep Descent,

Which opens in a Rock of large Extent! (Savage, p. 15)

The description of the cave carries the hallmarks of an entrance into the underworld, concealed by trees and behind a waterfall, yet it is also a place of habitation. The narrator descends into the cave and meets the Hermit who has made this 'Mansion in a barren Mountain' his home. The Hermit fled society after the death of his wife, Olympia, who in visions and dreams he tries to embrace but, like Aeneas' attempts to embrace his father, Anchises in Hades, 'the flitting shadow slipp'd away' (VI, 950 – 2).[22] He retires to the mountains and secures the cave after killing the previous inhabitant, a large snake, as Cadmus must do in Bk. III of Ovid's *Metamorphoses*, most recently translated by Joseph Addison (1717).[23] The cave and woodland settings are remarkably similar. In a display of intertextuality, Savage's friends are acknowledged in the cave as the Hermit has a small library which includes Thomson's *The Seasons*, Mallet's 'The Excursion,' and a collection of Alexander Pope's poetry (another friend of Savage's). The Hermit takes on the role of a guide for the Wanderer, as a Sibylline figure as the Wanderer refers to himself as 'Aeneas-like' (Savage, p. 72).

[22] *Virgil's Aeneid* trans. John Dryden (London: Penguin, 1997).
[23] *Ovid's Metamorphoses in Fifteen Books. Translated by the most Eminent Hands* (London: Jacob Tonson, 1717), p. 74.

The poem begins to conclude in Canto IV, when the Wanderer discovers a cave for his own secluded contemplation: 'Here ancient Knowledge opens Nature's Springs' (Savage, p. 94). The achievement of the descent narrative, the rite of passage through an alien world and the gaining of privileged knowledge, appears within his grasp. However, just as he prepares to settle in and observe the value of his discoveries, the Hermit appears and upbraids him for his casual and thoughtless assumption:

> Hear then! In this sequester'd Cave retir'd,
>
> Departed Saints converse with Men inspir'd,
>
> 'Tis sacred Ground; nor can thy Mind endure,
>
> Yet unprepared, an Intercourse so pure. (Savage, p. 96)

The Wanderer is not the chosen one; he has not been initiated. A simple descent and a desire to see everything is nothing but vanity. The underworld, the hidden recess of nature and all that it conceals, cannot be revealed through ordinary, idle curiosity. In the final Canto, the Hermit is chosen, and is transformed into the 'Seraph-Bard' and gains the light to see the 'Form of things' and 'celestial Knowledge' (Savage, p. 145); though for the Wanderer, 'While Contemplation weigh'd the mystic View / The Lights all vanish'd, and the Vision flew' (Savage, p. 149), he experiences a fleeting glimpse of the whole, a sense of the whole, but no realization of it. Like Thomson's and Mallet's narrators and characters, the dimension of caves, and the underworld, is too vast and complex to observe in local isolation.

The verse landscape narratives of Thomson, Mallet and Savage in the early eighteenth century make use of classical mythic allusions in relation to the descent narrative. However, they present the landscapes and caves not as allegories but as recognisable topographic phenomena. Their characters are ordinary, contemporary figures whose dreams and fears are played out in these landscapes.

The Descent Narrative as Parody.

The descent narrative must have been a familiar literary trope in eighteenth-century popular culture because for any trope to be used as a parody it must first be must be widely enough accepted to act through comparison. It is a mark of how familiar the descent narrative genre would be to the readers of poetry, who recognised the grandeur of the classical allusion and the absurdity of the contemporary experience.

In 1755, John Dalton writes about two women who descend a mine in a mock-heroic epic of a descent narrative, owing much to the poetry of Alexander Pope and his *The Rape of the Lock*. [24] The Dalton poem is presented explicitly as 'classical allusion and parody.'[25] The comic gendered juxtaposition is that of 'graceful and beautiful ladies' in the dark and the dank horrors of the underground. They are warned by the sibyl, in this case 'Prospero,' not to descend into 'the Mansions of Despair,' but, of course, in the tradition of narrative disobedience, they do. The poem begins with the arrival of the 'adventurous pair' to the 'balmy air' and 'light' at the surface. The 'mighty labour' of the anabatic journey, 'long and hard,' is over and the rest of the poem describes their descent through 'Tartarian tempests' (62), 'gloomy Dis' (72), 'loftier chambers of the deep' (78), 'Acherontic Rivers' (90), 'Infernal Darkness' (94), 'wild nature' (111) and 'glimmering shades' (117) and into 'the dark Recess' (147). Dalton creates an image of the bewildering complexity of the underground:

> Then with increasing wonder gaze
>
> The dark inextricable Maze;
>
> Where Cavern crossing Cavern meets,

[24] *Pope. Poetical Works*, ed. by Herbert Davis, (London: Oxford University Press, 1966), p. 86.
[25] John Dalton, *A Descriptive Poem Addressed to Two Ladies, at their Return from Viewing the Mines near Whitehaven* (London: Rivington and Dodsley, 1755), p. iv.

(City of subterranean Streets!)

Where in a triple story end

Mines that o'er Mines by flights ascend. (81 – 6)

The poem imagines potential underground topographies as well as sublime fears of being trapped in the dark and concealed multi-layered labyrinth. The fear is intensified by the darkness hiding the extraordinary extent of the labyrinth; the two ladies, if lost, would have no conception of the scale of their entrapment. The descent narrative requires an ascent back up and out, though here Dalton plays with the possibility of them finding no way of getting back out to the surface.

Dalton queries why the two women have descended and draws on the conventional quest for mystical knowledge, and the danger of unchecked curiosity: 'Was it because your curious eye / The secrets of the Earth would spy?' (17 – 18). The poem is a parody of their descent and suggests they, as 'heroines,' should avoid such descents and observe the effects of the mines and caves below on the surface above, 'And with an easy eye look down / On that fair port and happy town' (159 – 60). Here the voyagers do not convey what they saw on their descent as they have no voice to do so.

Parodies of the descent narrative were a part of popular culture, as is evident in the anonymous poems published in London on the military execution of Admiral John Byng in 1757, controversially found guilty of cowardice in a naval battle. These are sardonic poems both written in rhyming couplets in the mock-heroic style. With the use of the descent to Hades, they follow on from the anonymous attack on the poet, Matthew Prior, in *The Blasted Laurel*, for his obsequious corruption and, ultimately, bathetic descent.[26] It is the descent narrative as bathos, as anti-climax and regret, that these poems convey. In the first of the

[26]Anon., *The Blasted Laurel. A Poem* (London: Baldwin, 1702).

poems, Byng, the narrator, has just been shot by a naval firing squad, 'I thought to view the pleasing Glades, / That dart around Elysian Shades,' though soon learns otherwise, 'But now, alas! I grieve to tell, / I lost my Way, and sunk to H –.' Once in Hell, believing his high office on earth will aid his status and treatment, again he discovers otherwise, 'But here, in this Infernal Cave, / I'm treated like a Gally-slave.'[27] The second poem presents a similar irreverent fate for Byng, 'Byng's mortal course the fatal sentence ends, / And down he shuddering to the shades descends.'[28] Here he meets Hector and Achilles and other mythic warriors. These poems present the descent not as an act of volition, more as a fall, or a stumble, a succumbing to fate, a reckoning. We are led to believe the knowledge gained by Byng is regret.

These parodies provide further evidence of the place of the descent narrative in the culture of the time. They present a challenge to the role of the heroic male descender, firstly by presenting two women who descend without any struggle; and secondly by presenting a naval officer, in a role that would be traditionally understood as heroic, as a coward.

The Descent Narrative as a State of Mind.

Though much of the poetry of the eighteenth century presented the underground, and underworld, as a pre-eminent though inaccessible destination, others presented it, and the descent narrative, as a state of mind. It can be found in suicidal despair, guilt, abandonment, loss, and it can haunt dreams and nightmares. In this section, I will look at examples of the descent narrative as a state of mind, and focus on Edward Young's extremely popular, epic blank verse poem of faith and doubt, *Night Thoughts*. Young has his narrator descend in search of truth at a point of crisis in his faith.

[27] Anon., *A Poetical Epistle from Admiral Byng in the Infernal Shades, to his Friend L – A -, and Inhabitant on Earth* (London: Fuller, 1757), p. 7.
[28] Anon., *Admiral Byng in the Elysian Shades. A Poem* (London: Withy and Ryall, 1757), p. 3.

Before Young had written *Night Thoughts*, David Mallet, in his poem 'A Winter's Day. Written in a State of Melancholy,' had placed the narrator in a cavern of the mind, overwhelmed by 'black melancholy,' 'in this moss-cover'd cavern hopeless laid' (35).[29] While in the deep darkness, the underworld, the narrator experiences the worst of his despair, 'Shadows from each dark cavern now combine, / And stalk around, and mix their yells with mine (53 – 4). Mallet relies on the existing sublime topography of the underworld, though he is presenting an early example of the sublime as an emotional state. Such a state provided a common theme in his poetry as he provides a disorientating description of this fall into despair in the conclusion of his more familiar poem, 'The Excursion,' where he writes about his vain attempt to fully understand the power of God:

> That infinite diffusion, where the mind
>
> Conceives no limits: undistinguish'd void,
>
> Invariable, where no landmarks are,
>
> No paths to guide imagination's flight. (366 – 9)

All the underworld topography has gone; there are no landmarks, no paths, gates, rivers, only the dark void with the single dimension of depth. All coordinates expand infinitely from the observer's perspective. There is no object of vision only the awareness of the falling self. An associate of Mallet's, Mark Akenside, presents a similar fall in his poem based on Addison's essays on the sublime, *The Pleasures of the Imagination* (1757):

> And the frail soul plunged headlong from the brink
>
> Of life and daylight down the gloomy air,

[29] David Mallet, *The Poetical Works* (Edinburgh: The Apollo Press, 1780), p. 170.

An unknown depth.' (II. 429 – 31)[30]

Though a state of mind, the descent in both these cases, and in Young's poem below, suggests, without directly stating it, that the fall is subterranean. It is from a stance ('the brink') and into unfathomable darkness below.

It is apparent in their perceptions, that in the dimension of depth is the rite of passage, the way to uncover what is hidden. Their descriptions of their fall are like those offered by Charles Povey in 1742. In his view hell, or faithless despair, is where God is not; the immaterial spirit does, however, experience the darkness and the dimension of depth in the 'abyss of darkness' (Povey, p. 11). The person approaching death or despair, as seen in Povey and Akenside, also, briefly, experiences the sensation of being on the brink of the fall, another topographical feature associated with the underground and the dimension of depth. It also acts as one of the key elements of the sublime, as object, emotion or image. In *Paradise Lost*, Milton's Satan provides us with sublime archetype when, after unlocking the gate of hell, he steps through and stands on the brink of chaos, wings ready to try and steady him in his plunge, 'Into this wild abyss the wary Fiend / Stood on the brink of hell and looked a while' (II. 917 – 8). It is Milton, again, who also provides the archetype for a space without dimension, 'the hoary deep, a dark / Illimitable ocean without bound, / Without dimension, where length, breadth, and highth, / And time and place are lost' (II. 891 – 3). Here is displacement in an imagined sublime descent, into a dark void, one that could translate easily into a state of mind. Here is the imagined space beneath our unstable surface, described in topographical detail by Burnet, Thomson and Mallet, where the earth could open without warning and precipitate the descent.

In the eighteenth century, developments in natural philosophy, and the philosophy of aesthetics, were creating the conditions for a crisis in faith. Such a crisis drew attention to the

[30] Mark Akenside, *The Poetical Works* (Edinburgh: James Nicol, 1858).

fate of the faithless, and, as stated above, the nature and shape of hell or the after-life. James Hillman writes:

> Imaginary space is not a mere receptacle but comes already loaded with significances about "up" and "down," "surface" and "deep," "close" and "remote." It brings with it ontological, and aesthetic and moral considerations that are reflected in many spiritual topographies of religions.[31]

These motifs all feature in one of the most popular poems of the eighteenth century, Edward Young's epic, *Night Thoughts* (1742).[32] It is in 'Night the Ninth and Last. The Consolation' where the narrator's imagination and conscience approach the questions of death, doubt, despair and faith, which are framed by a descent narrative; throughout the book there are recurring images and references to the dark depths of the underworld, or hell. For Young, humanity's arrogance in the pursuit of reason and natural philosophy, and the abandonment of God, is the cause of the descent. He uses, as an example, our attempt to understand the origin of caves and their overwhelming sublimity to show our vanity:

> Nature herself does Half the Work of Man:
>
> Seas, Rivers, Mountains, Forests, Deserts, Rocks,
>
> The Promontory's Height, the Depth profound
>
> Of subterranean, excavated Grots,
>
> Black-brow'd, and vaulted-high, and yawning wide
>
> From Nature's Structure, or the Scoop of Time;
>
> If ample of Dimension, vast of Size,

[31] James Hillman, *The Dream and the Underworld* (New York: Harper, 1979), p. 16.
[32] Edward Young, *Night Thoughts* ed. by Stephen Cornford (Cambridge: Cambridge University Press, 1989), p. 257.

> Even These an aggrandizing Impulse give. (IX. 907 – 14)

'Even These' caves and our scientific and aesthetic understanding of them make us arrogant and forgetful of our religious duty. The narrator and his companion, Lorenzo, are initially not aware they are on the brink, until, as Burnet and Mallet have figuratively shown, the earth gapes: 'Where are we now? Ah me! The ground is gone / On which we stood!' (IX. 211 – 2). Spatially, the cave is always closer than perceived. The fall into the abyss commences as the 'fallen' are locked in hell and hurled from heaven: 'Down, down she hurls it thro' the dark Profound, / Ten thousand thousand Fathom' (IX. 346 – 7). The fall into boundless depth due to human vanity and godless natural philosophy, is a recurring motif in Young's poem. The poem was one of the central texts that expressed the conflict between science and faith in the mid-eighteenth century.

The imagery of descent occurs in contrasting sections of the poem. A superficial perspective gives the human mind nothing but waste, faeces in the toilet pit:

> Take God from Nature, nothing Great is left;
>
> Man's Mind is in a Pit, and nothing sees;
>
> Man's Heart is in the Jakes, and loves the Mire;
>
> Emerge from thy Profound; erect thine Eye;
>
> See thy Distress! (IX. 1394 – 8)

Here he concludes that the despairing individual should look up and 'see' the miry depths in which they are sunk. What he understands as self-serving rationality leads to the blind depths where only your distress can be 'seen.' The idea of the underground being a place of ignorance is the conclusion of H. Spens. In the 1763 preface to his translation of Plato's *Republic*, Spens argues that Plato's allegory of the cave, with the prisoners watching illuminated shadows of reality on the wall in front of them, is a revelation of the true path to God:

> It gives us a lively representation of the ignorance and degeneracy of mankind in the present state, where numbers are busied in pursuing after shadows, as the only real and substantial goods; while they neglect the culture of the mind, and never raise their ideas to the beauty and perfection of that supreme intelligence, which is the origin and end of all.[33]

Vision for Young, however, can be attained by depth, if we look hard and deep enough to by-pass our own self-serving vanity and illusions. If we get passed the faeces and filth, look beyond the shadows, gold, or revelation, can be found:

> Look Inward, and look Deep; and deeper still;
>
> Unfathomably deep our Treasure runs
>
> In golden Veins thro' all Eternity. (IX. 424 -7)

Young's recurring motif of the descent eventually brings his narrator to the realisation, his discovery, of faith in God, not his own reason. This is what he gains from his descent to the underworld as a state of mind. The poem becomes a commentary on the developments of natural philosophy, through the application of deductive reasoning and empiricism rather than a belief in revelation through the scriptures:

> I quite mistook my Road,
>
> Born in an Age more Curious than Devout
>
> More fond to fix the Place of Heaven or Hell,
>
> Than studious this to shun, or that secure.
>
> 'Tis not the curious, but the pious Path,

[33] *The Republic of Plato in Ten Books*, trans. by H. Spens (Glasgow: Foulis, 1763), p. xxi.

That leads me to my point. (IX. 1850 – 6)

The metaphor of the path, whether above ground or below, for the pursuit of knowledge is ubiquitous in the writing of this period and generates one of the key areas for the individual's struggle, that between curiosity and piety. This is a topic that will be examined in more detail in the following chapter. Here Young applies it to enquiries into the nature and place of heaven and hell, the cosmos and the underground. Hell is not underground; he appears to have discovered that, it is a state, or absence, of mind. What knowledge he has achieved from his descent, what truth has been revealed, or 'unforgotten,' is his faith. It is also what Milton's Satan discovers, 'Long is the way and hard, that out of hell leads up to light.' Young writes:

I wake; and walking, climb Night's radiant Scale,

From Sphere to Sphere; the Steps by Nature set

For Man's Ascent. (IX. 1710 – 2)

For Young, the discovery of this essential truth is what enables his ascent back up to the surface and, potentially, his salvation. His descent is not a hopeless fall into unknown depths and ultimate oblivion; like the classical hero, Aeneas, he must return with what he went to find.

Caves and the Poetry of Place.

Associated with this struggle of the observational, psychological and theological descent narrative was the poetry of place, and, particularly, the cave as a material and known place rather than an imagined one. Poetry of place that included, or focused on, caves tells us much about the how caves were becoming a familiar marker of the uniqueness of landscapes. Along with the travel writing discussed in the following chapter, these poems identified caves as important places of experience and memory. Gary Snyder, writes, 'Our relation to the natural

world takes place in a *place*, and it must be grounded in information and experience.'[34] The caves described in the poetry so far in this chapter, were based on the idea of real caves in mountains, the entrance surrounded by trees and a river flowing out of it; the caves had dimensions and were always dark beyond the flickering candle, but they were not identifiable; they were imagined spaces. Yi Fu Tuan, writes, 'Space is transformed into place as it acquires definition and meaning […] Place is an organized world of meaning' (Tuan, p. 136). As poetry engaged with natural philosophy and the aesthetic of the sublime, it also engaged with the discovery, identification and recognition of landscapes, which included caves.

The poetry of hills and rivers came to prominence in the seventeenth century with poems such as Sir John Denham's 'Coopers Hill' (1688). The added uniqueness of place, its essence or 'genius' (spirit) found expression in Alexander Pope's 'Epistle IV, to Burlington' (1744), 'Consult the Genius of Place in all.'[35] As caves increasingly became the subject of study, they also became the subject of people's attachment to place. John Barrell, writes that the meaning of the word landscape is to 'see' the land, and to see it in a culturally determined way: 'The contemplation of landscape was not a passive activity: it involved reconstructing the landscape in the imagination, according to the principles of composition.'[36] One of the principles of composition is securing a distance between the landscape and the observer to enable perspective. Here the observer would ideally climb to the summit of the hill before describing what was visible around him or her. Though observing from an altitude, the perspective of distance would be largely horizontal. The caves would be invisible and, therefore, not 'part' of the landscape. This is evident in the poem, *Edge-Hill* by Richard Jago (1767), whose narrator climbs to the top of the hill before beginning to describe the view of

[34] Gary Snyder, 'The place, the region, and the commons' in *The Practice of the Wild: Essays* (Emeryville: Shoemaker & Hoard, 1990), p. 42.
[35] Alexander Pope, *Poetical Works* ed. by Herbert Davis (London: Oxford University Press, 1966), p. 316.
[36] John Barrell, *The Idea of the Landscape and the Sense of Place 1730 – 1840: An Approach to the Poetry of John Clare* (Cambridge: Cambridge University Press, 1972), p. 6.

the sunlit and neatly domesticated, and owned, countryside surrounding him; towards the end he adds the caves and mines of the Edge-Hill district which lie in the dark and within a vertical, unseen perspective. Jago comments on the catastrophic floods and explosive gas of the 'subterraneous city', 'the crumbly caverns,' 'the gloomy Cave,' yet eulogizes the owner for controlling the wild space with drains and air-pumps. However successful this domesticating of the wild appears to be, there still lie troubled, and sublime, fears below:

> Appall'd with Thoughts of Bog, or cavern'd Pit,
>
> Or treach'rous Earth, subsiding where they tread,
>
> Tremendous Passage to the Realms of Death! (III. 474 – 6)[37]

Though establishing an understanding of place generally, the idea, and fear, of the hidden subterranean environment, the corresponding underworld and the threatening sublime, act to displace the cave in the landscape. This displacement puts the cave at odds with the scenes of rural order, beauty and plenty clearly visible above. The caves and mines are located, but remain elusive, concealed, out of sight.

Anna Seward in her place poem, 'Colebrook Dale' (1785), inverts the classical descent motif and has the underworld release its hidden horrors on the world above, despoiling the beauty of Colebrook Dale through the extraction of ore and the resulting pollution and industrialization: 'The Genius of thy shade, by Plutus bribed.'[38] The poem concludes with the inversion and the once beautiful valley becomes hell: 'And to a gloomy Erebus transform / The destined rival of Tempean vales.' It is clear throughout the poem that this is valley displaced, and the underground perceived through its effects, not in itself.

---

[37] Richard Jago, *Edge-Hill; or, the Rural Prospect Delineated and Moralized. A Poem, in Four Books* (London: Dodsley, 1767), p. 110.
[38] Anna Seward, 'Colebrook Dale' in *Romantic Women Poets 1770 – 1838* ed. by Andrew Ashfield (Manchester: Manchester University Press, 1995), p. 7.

Thomas Dixon, in his poem about the Yorkshire mountain, Ingleborough and the River Wenning (1781) is similar in his reluctance to descend below ground. The caves remain in the dimension of invisibility. He does go further than Jago in *Edge-Hill* and names the caves and potholes seen from the mountain's summit that are the sources of the river. Dixon enters Yordas Cave in Kingsdale though his more engaging descriptions are of the caves on the mountain, Gragareth, above. The two caves he mentions (now known as Jingling Pot and Rowten Pot) can be seen from the summit of Ingleborough, though they are dark holes, not an object of sight at all:

> Near which are seen the clefts of Gingling-cove,
>
> Its form and depth the curious ne'er could prove;
>
> The falling stones from rock to rock rebound,
>
> The dark abyss returns a tinkling sound.
>
> The Routing-Chasm amazing to behold,
>
> With dreadful yawn intimidates the bold;
>
> The depth unknown, vast, dismal, dark and wide,
>
> With rugged painted rocks on every side;
>
> A rapid stream falls in with hideous roar,
>
> Growls through the mountain to some distant shore:
>
> Dismay arrests the man that ventures near,
>
> His face turns pale, his courage yields to fear. (47 - 58)[39]

[39] Thomas Dixon, *A Description of the Environs of Ingleborough and Principle Places on the Banks of the River Wenning* (Kendal: Ashburner, 1781).

Dixon's view of the caves rhetorically conveys all the qualities of the sublime object in its dimensions and the bewildered mind as it peers down into the unknown depths. There is no embodied experience, only the imagination peering down into the dark. The district around the caves is described in detail though the caves remain, as do those of Jago, a displaced void. However, these voids beneath the surface, these hidden recesses, are an essential element of what makes the place in question special, gives it a spirit, or 'genius,' and worthy of being memorialised in poetry.

Perhaps the most engaging place poem of the eighteenth century was one written originally in Latin in 1636 by Thomas Hobbes, under the title *De mirabilius Pecci*, or as it became known in 1681 after it had been translated into English by Charles Cotton, *The Wonders of the Peak*.[40] This poem is important because it attempts to act as a guide as well as a celebration of place. The poem went through numerous editions in the eighteenth century, possibly due to the popularity of tours to the Peak District to visit these 'Wonders,' wonders that were probably inspired by the poem in the first place. Three of the 'Wonders' were caves: Poole's Hole, Eldon Hole and Peak Cavern (or The Devil's Arse). It is fascinating that three of the seven wonders are caves in a district renowned for its hills.

The descent narrative of Poole's Hole conveys many elements of the sublime before it had been theorized, though it also introduces the embodied sublime. This is not an imagined descent narrative, it is a real one. The observer is not safely detached from the sublime object but is embodied within it. He describes the entrance as the 'Crypto-porticus of Hell' that is too low and narrow for most people, suitable only for 'badgers, wolves and foxes,' though the slim can crawl on hands and knees, over rocks and dirt to get inside. Once in the observer must climb and scramble to get about:

[40]Charles Cotton, *The Wonders of the Peak* (Nottingham: Thomas Collyer, 1744).

> The dreadful channel of the rapid brook,
>
> So deep, and black, the very thought does make
>
> My brains turn giddy, and my eye-balls ake.
>
> Over this dangerous precipice you crawl,
>
> Lost if you slip, for if you slip you fall. (Cotton, p. 7)

The narrator takes the reader to the brink of a dark abyss in a familiar motif, and offers diminished vision and disorientation before the potential plunge. He or she describe in detail the features of the cave and give them the names the locals have coined. These names and objects appear in the travel journals of others who visit, and the then-assumed process of calcification and the formation of stalactites is included too. Here is evidence of definition and meaning transforming an imagined subterranean space into an observable place, and once it is the focus of attention the process can begin that will take what was thought to be an effect of chaos and ruin to a form of order that is much more complicated than imagined. Yet, the observer must get out of the cave, and the ascent, or 'deliverance,' is more dangerous than the descent:

> Thus after long restraint, when once set free
>
> Men better taste the air of liberty. (p. 16)

As noted above, this is a familiar motif from classical literature. The descent is to be made by all, there is nothing special about it; it is the ascent back to the surface and the defiance of fate that is special. Though describing a tourist trip, and being an example of comic hyperbole, the poem's purpose is to persuade the reader to show courage equal to the poet's and venture underground.

The narrator visits Eldon Hole, a large open surface shaft that at the time had not been descended, though a local man had been lowered down and pulled back up in a state of madness. He describes 'standing on the brink of Hell,' staring with horror into the 'yawning mouth' (p. 23). Although the usual hyperbole is used, for example, 'Tarterean shades,' 'infernal mansions,' the observer is interested in the ways the locals have tried to trace the water to gauge the dimensions of the system of caves below.

In Peak Cavern, the narrator finds the small rope-making community living there, their houses sheltered by the cavern roof. Again, hyperbole is used for comic effect, for example, 'gloomy vaults' and 'Court of Dis,' and as the cave is also known as The Devil's Arse, the narrator describes 'the Devil's fundament,' and 'the intestinum rectum of the fiend.' As with Poole's Hole, the journey into this cave requires an approach that all the visitors that follow must take:

> Some paces hence the roof comes down so low,
>
> The humblest statures are compell'd to bow,
>
> First low, then lower; 'till at last we go
>
> On four feet now who walk'd before on two. (p. 36)

Further progress is made into the cave by 'squeezing our guts, bruising our flesh and bones […] puffing and sweating in our industry' (p. 39). They exit the cave after 'falls and knocks, tho' almost lame' (p. 46) and make it back to the surface, wishing they had had a Golden Bough, like that used by Aeneas on his descent into Hades. This poem, which precedes all the other poems included here, is the only one that provides an embodied account of a cave experience.

The poems blend together the human and natural history of the place, with the physical experience of passing in and out of it. As Tuan writes, 'Historical time and orientated space are aspects of a single experience' (Tuan, p. 120). Creating a sense of place is a way of

understanding the natural world, and these poems, fragmentary and comic though they may be, have contributed to that. The writers have displayed a variety of ways of imagining, seeing and experiencing the underground, using the classical descent narrative to frame aesthetic responses.

Descent Narratives and the Novel.

The eighteenth-century descent narrative developed further with the rise of the novel. With some early novels structured as journals, sequences of letters and found manuscripts, the novel offered the writer the opportunity to explore fictional landscapes as if they were genuine accounts of real travel. The form of the novel drew the writer away from the classical poem and the traditional descent narrative and enabled him or her to explore the landscape and caves of natural philosophers, geologists and travellers with more realism and accuracy, with characters drawn from their readers' familiar world.

While Daniel Defoe appears to have suggested the first descent narrative in fictional prose in his 1719 novel, *Robinson Crusoe*, the first to suggest a journey after death is Henry Fielding's satirical novel of 1745, *A Journey from this World to the Next*.[41] Though not a descent narrative to the underworld, more like a sideways journey into a parallel spirit world, it does address the problem of the narrator and the narrative's authenticity and provenance. In the novel, the mysterious manuscript of the journey has been found by the narrator through chance, a sheet of it used to wrap the pens bought from his stationer, and out of curiosity he recovers the rest of the almost unintelligible fragmentary manuscript from the same source. It had been found in the garret the stationer rented out to a man who had vanished without paying his rent. The narrator stresses the uncertainty of the narrative; it is either a dream or vision, or the ramblings of a 'choice Inhabitant of New Bethlehem.' The manuscript's narrator

[41] Henry Fielding, *A Journey from this World to the Next* ed. by Ian Bell and Andrew Varney (Oxford: Oxford University Press, 1997), p. 3.

opens the narrative with his death and explains why his spirit remained in the body for some time, due to the possibility of him not being dead. Herein lay one of the fears most commonly expressed in descents into caves, that of being buried alive, or lost and trapped in the dark.

Tobias Smollett further satirised the travel journal and descent narrative in his epistolary novel of 1771, *The Expedition of Humphry Clinker*. The opening letters are concerned with the publishing of the Bramble family's letters written on their travels. They are offered out of duty for 'the information and edification of mankind.'[42] Though the publisher only takes them due to the proliferation of travel journals: 'the public seem to be cloyed with that kind of entertainment' (Smollett, p. 5). Travellers would often incorporate a descent narrative into the journal to match the voyage of Aeneas. The ridiculous Bramble family follow the well-worn path to the Devil's Arse (Peak Cavern) and Eldon Hole, playing up the dangers ('perils') of the journey and descent while inadvertently mocking popular assumptions. The squire's sister, Tabitha Bramble, writes: 'It has pleased Providence to bring us safe back to England, and partake us in many pearls by land and water, in particular the *Devil's Harse a-pike*, and *Hoyden's Hole*, which hath got no bottom' (Smollett, p. 305). The misspellings of the cave's names add to the satire, as well as the 'bottomless' pun on the 'Devil's Arse.' The gods ensured their safe return after the descent to the underworld and their epic voyage.

A perhaps surprising descent narrative is Samuel Richardson's epistolary novel of 1748, *Clarissa*, where both central characters, Clarissa Harlowe and Robert Lovelace, narrate their descent.[43] Though there are no physical descents of caves in the novel, there is a psychological one which suggests the influence of travel writing. This merging of the mind and cave in the pursuit of the 'hidden recesses of (human) nature' is further alluded to by Diderot

[42] Tobias Smollett, *The Expedition of Humphry Clinker* ed. by Shaun Regan (London: Penguin, 2008), p. 3.
[43] Samuel Richardson, *Clarissa, or the History of a Young Lady* ed. by Angus Ross (London: Penguin, 1985).

in his 'Eulogy for Richardson,' in 1761, where he writes: 'It is Richardson who carries his torch to the back of the cave; and it is he who teaches you to discern the subtle and dishonourable motives concealing themselves from view behind other motives which are honourable and that hasten to show themselves first.'[44] Throughout the novel, Lovelace is compared to, and identified as, Satan; though after his rape of Clarissa, and her eventual death, Lovelace identifies himself much more heroically to Aeneas and Clarissa to Dido (Richardson, p. 1142). Shortly after making this comparison he relates a nightmare where he is confronted with the outrage of her family and contemplates suicide; the ceiling opens and an angel descends and lifts Clarissa heaven wards, while for him: 'And then (horrid to relate!) the floor sinking under me, as the ceiling had opened for her, I dropped into a hole more frightful than that of Elden and tumbling over and over down it, without view of the bottom, I awaked in a panic' (Richardson, p. 1218). Aeneas meets a silent Dido on his descent to the underworld after her suicide. Lovelace's language of personal disintegration echoes that used by Richardson's friend, Edward Young, in his poem *Night Thoughts*, while also referring to Eldon Hole's fabled infinite descent ('which hath got no bottom'). It also draws parallels with the descent narratives of travellers who discover the instability of the self in a vertical space of privation, of darkness, silence and solitude. In one of his final letters to his correspondent, Belford, while preparing to leave for Paris where he will be killed, Lovelace writes, 'I am preparing to leave this kingdom.' This is done in the knowledge that his final descent is imminent, and that he will soon be dead.

The novelist Thomas Amory in his two novels, *Memoirs of Several Ladies of Great Britain* (1755) and *The Life of John Buncle, Esquire* (1766), makes repeated and extraordinary use of the descent narrative. Both novels are structured as the memoirs of the character, John Buncle, and his travels around Scotland and the north of England, mainly in Yorkshire.

[44] William Beatty Warner *Reading Clarissa: The Struggles of Interpretation* (New Haven: Yale University Press, 1979), p. 222.

Descents into caves are not isolated events; they occur regularly throughout both novels. The character is defined by his caving exploits. Buncle combines real locations and imaginary descents. He incorporates reports from the Royal Society's *Philosophical Transactions* with his own imagined explorations. He is a man of the scientific enlightenment, examining his dreams and fears, as well as his empirical and rational understanding of humanity and nature, much of it within the sublime environments of caves.

Amory's gregarious narrator and the central character, Buncle, compares himself heroically with Aeneas when at the foot of a dark and narrow gorge: 'it brought to my remembrance Anchises's son, the wandering prince of Troy, when he descended to the shades below.'[45] No other novelist in the eighteenth century makes use of the cave and the descent narrative like Amory. Throughout his novels, he has his narrator pass through the wild places of the Western Isles of Scotland, Westmorland, Cumberland and North Yorkshire. Passages through these places are presented as bewilderingly sublime and difficult; they are invariably deep and narrow gorges or caves. Each passage presents the crossing of a threshold, liminal crossings into the subliminal, and the subterranean, as the narrator 'traverses the land.' What he finds on the other side of each threshold is a recess, in 'the wildest part of the universe,' that has remained hidden, concealed from the unadventurous, the unimaginative and the unperceptive. He writes in the introduction to the *Memoirs*:

> Many a time has my uncommon passion for the extraordinary works of nature, and other curious things, brought me to pass a night in a cave, or lie on the fern of a mountain: but I had always reason to rejoice in the end for the fortunate acquaintance my adversity produced.[46]

[45] Thomas Amory *The Life of John Buncle, Esq.* 2 vols (New York: Garland Publishing, 1766; repr. 1975), I, p. 293.
[46] Thomas Amory *Memoirs of Several Ladies of Great Britain* (London: John Noon, 1755), p. vii.

In the hidden recesses of nature, he discovers philosophical communities of families, of men and of women; he finds grand houses, fertile valleys, hermits, books as well as caves, grottos and lakes. He claims that he ventures where few others would go, presenting each barrier as a '*ne plus ultra*' that he always overcomes, and risks his life in his desire and pursuit of knowledge. He creates his own self-mythology, as well as appropriating Virgil's; when he passes through caves, tumbles out of them and meets the surprised recluses on the other side he calls himself 'the genie of the caverns, from the hollows of the mountains' (Amory, 1975, p. 100). He is driven by curiosity and overwhelmed by observations. However, as with many other eighteenth-century texts based on travel and curiosity, there is little synthesis of ideas or observations. Buncle states that his favourite book as an undergraduate was John Locke's *An Essay on Human Understanding* which he read three times. Buncle is the epitome of the Lockean man of learning, he embraces empirical understanding and the full exposure of his senses to the world around him. Buncle's observations are bold and reckless, assertive and dynamic, and it is in the cave that he uncovers the most.

Amory's character is challenged with limits throughout both novels, limits that he is impelled to transgress. Having been shown the books and manuscripts of the library at the reclusive philosophers' house at Ulubrae, in Stainmore, North Yorkshire, the philosophers show him a cornelian engraved with roman god of bounds, Terminus and the Latin words '*concedo nulli*' ('I yield to nobody' or 'I suffer none to pass the limit'). It was said to be the motto of the scholar, Erasmus, not borne out of pride but out of recognition of death, that life is short (Amory, p. 362). The next thing they show Buncle is a cave in the side of a mountain, a mile north of the house, and warn him not to descend it. Drawing on reason and his own empirical experience, he compares this cave with Penpark Hole in Gloucestershire, descended by Sturmy and Collins, and Pool's Hole in the Derbyshire Peak, and provides extensive footnotes to show his knowledge; he prepares to descend it.

The impasse in the cave is a sixty-seven yards' deep shaft that has never been descended. Being a man of the enlightenment, he hears running water, and the research of natural philosopher, Robert Boyle, on running water and fresh air suggests to him that death will not come through suffocation. He and Ralph are lowered down the shaft and begin their exploration. They wade through the water-logged passage measuring it and taking note of directions as they go. They observe 'stalactical concretions' that form 'the most beautiful pillars, walls, and figures of the finest carved work,' and pass through caverns that are too big to see and in them they observe nothing. The return is by a climb up a waterfall, described as 'a laborious route, and at the hazard of our lives, many times performed.' Ralph falls in the river on the 'great ascent' and loses his torch, Buncle tries to save him and loses his:

> This reduced us to a state of the blackest darkness, and in that condition, we could not stir. It was a horrible scene. It chilled my blood, and curdled it in my veins: but I had a tinder-box, matches, and a wax-candle in my pocket, and soon recovered the desirable light; at which we lit other torches, and proceeded to ascend the rough and rocky steep, till we came to the fountain that made the descending flood. The opening upwards from that became very narrow, and the slant so great, that it was extremely difficult to go on; but as I could see the day at the end of it, I resolved to strive hard, and mount, if possible, these remaining 60 yards. In short, we did the work. (Amory, p. 368)

The return in a descent narrative is always the most hazardous part. Buncle's reason initially overcomes the frailty of his body and produces the necessary light then his body and strength haul him to safety. He passes the limit, the boundary that the philosophers set; he rejected the terminus and its '*concedo nulli*.' Like Aeneas, Buncle returns from the land of the dead and the engraved cornelian with its mortal warning frames the journey. Buncle, a precursor to Coleridge's archetype in the Ancient Mariner, describes himself as 'a wanderer on the face

of the earth' (Amory, II, p. 64), and then retells the story to Harriot Harcourt who lives in a house near the exit to the cave: 'with the greatest difficulty I climbed up, I should happen to get a fall, as in all human probability I would, and break a limb in the most dismal cavities of eternal night, I must have perished in the most miserable manner, without a possibility of obtaining relief' (Amory, I, p.369). He rides on from the Harcourt's house, passes through another cave into Skelsmore-Vale and Charles Turner's house, and re-tells the tale again to Charles' sister (Amory, p. 408). As Falconer has written, the arc of the journey becomes visible when remembered and retold (Falconer, p.1).

Amory uses his cave adventures to engage with the dark, silent and solitary aspects of the sublime that encompass the fear of being lost. In the second volume of the novel, one of Buncle's departures from Orton-Lodge brings him to a deep, dark pass through mountains that is only just wide enough for his horses, with a stream running through it. Buncle calls it 'as shocking a foot-way as I had ever seen' (Amory, II. p. 210). It is yet another of Buncle's thresholds that must be passed; almost every one of his journeys incorporates a formidable natural obstacle. On this occasion, he sends his lad, Finn, through first. After a six hour wait, Buncle goes in search for him, wading up the cleft for half a mile to a glen surrounded by precipices, in which are many cave entrances. It is clear Finn has entered one, though Buncle can only guess which. He gropes in the dark labyrinth with no light, shouting for Finn. He returns to the daylight and waits; Finn eventually appears and tells Buncle:

> He never expected to see the day-light more: for after he had foolishly gone too far into the caves, till he was quite in the dark, in hopes of finding a passage through the mountain to some open country, he was obliged to wander from chamber to chamber he knew not where for many hours, without one ray of light, and with little expectation of deliverance; that he did nothing but cry and roar, and was hardly able

> to stand on his legs any longer, when by a chance turn into a cave, he saw some light again, and then soon found his way out. (Amory, p. 212)

Here Finn provides an account of the descent narrative: lost and deprived of sight, hearing nothing but his own cries for help, his hands out-stretched for obstacles while always fearing a fall. Like Buncle in the previous cave, with 'chilled and curdled blood,' Finn's legs give way, his body's reactions overwhelming his volition, but unlike Buncle, it is chance, not fortitude that gets him out. Finn is Buncle's servant and is not made of the same metal.

In *Memoirs of Several Ladies of Great Britain* (1755), Amory has Buncle follow Finn's descent narrative when entering a cave on the Scottish Isle of Lewis. He is attracted into the cave by the sound of a 'hideous and hollow noise' from within, and is soon deep in the cave and out of sight of the entrance:

> Out of curiosity we had foolishly gone too far, without looking behind us, we did not think of returning, till we dared not to stir one step backward or forward. We were by this time not far from the origin of the dreadful noise, and to enhance the terrors of the abyss we were in, the two lights the servants had, went out suddenly, by a vapor, that rises so far within this dismal place. It was frightful. In vain we looked for the light of the entrance. Not the least ray could we see to minister any comfort. For several hours, we sat in unspeakable horror. (Amory, 1755, p. 170)

They are eventually saved by their hosts on the island who come looking for them. Buncle, like Finn, concludes his descent narrative with his deliverance:

> There was a joy in our deliverance, that may be a feint image of a happy resurrection. Our case was, that instead of going right onwards, we insensibly went to the left, and would have been lost for ever in a labyrinth of caves, if we had attempted to find our way back in the dark. (Amory, p. 171)

In this descent narrative, as with Finn's, we see all the key tropes of the period: curiosity, crossing a threshold and then going too far, darkness and sensory deprivation, being lost in a labyrinth and a sense of premature burial. They experience 'insensible' hopelessness and impending oblivion before their lucky escapes and returns to the surface. The Christian 'happy resurrection' and their salvation, or deliverance, appear to modify the pagan descent narrative with Buncle's faith.

Amory's liminal narratives, whether through descent or mountaineering, are pathways to knowledge. They are not fleeting moments of shallow curiosity and wonder, but ways to knowledge through struggle, tenacity and a willingness to go beyond conventional limits and engage with danger. The liminal and descent narratives merge in Amory's postscript to *Memoirs*, when his ship heading for St Kilda is swept off course to the Cape Verde Islands and there finds the entrance to a cave at the foot of a huge forested doline, a crater-like landform. They descend into it by way of a rope ladder and then pass through several chambers, one the size of a cathedral, down another perpendicular shaft, along a narrow rift, through nine room-sized chambers, and finally arrive at a large 'orbicular' chamber made of 'red veined Siena marble.' Therein is a table:

> There was a folio book in Manuscript upon the table, that was fastened together with silver clasps, and the writing seemed very beautiful, but in stenographical characters to me and my friend, at that time unknown. The title however was in the Saxon hand, *Historiae Naturales*; and the name of the writer, Morchar the *Carmelite*, AD. 1422. (Amory, p. 448)

They find their exit has been blocked by a fallen rock, and all the other ways they try are equally impassable: 'they were all terminated by everlasting stone, or some headlong waters that were horrible to hear and seemed as it were to fall into the rivers of hell' (Amory, p. 449). With his last remaining torch, Buncle searches the chamber and finds a narrow sloping passage

leading to a hole, at the foot of which is an iron ring fastened to a flag-stone, and beyond which is a flight of stone steps terminated by a common sight in Buncle stories, an opening into a secluded fertile valley. He returns to the surface and carries with him, from the underworld, the recluse's book on natural history, he writes: 'I have since made out the alphabet of it, it is a fine reward for the danger I ran in acquiring it.' His friend tells him:

> He would never more accompany me in my ascents or descents for curiositys in any untravelled way. He had some reason, to be sure. We were four and twenty hours in the bowels of this mountain, and ten thousand to one against us that we never got out. (Amory, p. 450)

Here the descent narrative does not simply provide Buncle with an experience of personal struggle, it provides him with material knowledge in the form of a book. The liminal narrative requires Buncle to struggle further and translate it, thus, for Buncle, increasing its value even more. Not only is it the book as a prime object of knowledge that has value but this book is an original ancient manuscript, with the ancient technology of silver clasps written in a dead language. It is an object that conveys knowledge across time and space; it is a natural history of the earth that Buncle must descend to the underworld and bring back, back to a newly discovered place of great fertility. Here Amory adapts the classical myth of the descent narrative and adapts it to become the defining myth of the enlightenment.

Conclusion.

Poets and novelists in the eighteenth century have adapted and transformed the descent narrative. They have opened the character of the descender, from the selected hero, or demi-god, to the ordinary person. John Locke urged people to observe their environment, to use their senses to experience it, and this need not only apply to natural philosophers. This desire to engage with nature, along with what Nicholson called the 'profound revolution' in landscape aesthetics, saw an increase in the number of people eager to experience wild and

remote regions of the country. The hidden recesses of nature can be observed by any who have the time, patience and imagination to do so. From Burnet to Buncle, the descent to the underground reveals previously concealed nature to those willing to cross the cave threshold. The descent narrative is also the perfect vehicle to experience the aesthetics of the sublime, whether the rhetoric, the cave or the mind. The sublime affects observation; it affects the body and the experience. In a time of such rapid change, the descent narrative frames despair and the instability of doubt. The subject of the descent need not be a hero any longer, though he or she needs heroic qualities to return to the surface literally or figuratively.

What is evident in the descent narratives and representation of the underground is the intertextuality. Poets and novelists read the work of natural philosophers, particularly Burnet. Burnet is a key figure whose natural philosophy features regularly in the work of writers in the long eighteenth century, from Thomson to Coleridge. They acknowledge each other in their writing, use the travel genre for parody as well as being travel writers themselves. Defoe, for example, is both a novelist and travel writer who descends caves; Amory has his fictional character descend caves and refers to real descents of caves in footnotes drawn from issues of *Philosophical Transactions*. This is a further example of the mobility of knowledge during the eighteenth century, one of the essential factors in the transformation of the understanding and perception of nature and caves. Though the knowledge is made mobile, it is also local. Amory, for example, sets his descent narratives in the West Riding of Yorkshire, a region just beginning to be recognised as a major source of caves and other writers locate their experiences within the highly popular 'Wonders of the Peak.' It is evident that the poetry and novels of the period are part of the literature of science and travel in relation to cave experiences.

Chapter Three: Caves and Travel Writing

Introduction.

As this thesis has shown, the transformation of the way that mountain and cave landscapes were perceived was partly due to the emergence and development of both natural philosophy and the sublime aesthetic. These developments were gradual processes that required a considerable increase in the numbers of fieldworkers, or reporters from the field, who were dependent on an individual's independent wealth and free time, improvements in transport and accommodation in remote mountain regions, and improvements in information, such as maps and guides.[1] Information had to become 'mobile' and be shared.[2] The growth of popular travel and tourism beyond the aristocratic grand tour, corresponded with the growth in the number of people reporting back from descents into caves, increasing considerably the paradigm community, while at the same time broadening its diversity. Reports from the field often appeared through the formal mediation of the Royal Society in the *Philosophical Transactions*, though the greater quantity addressed the reading public through popular books, such as travel journals and diaries. Such books were used as guides and encouraged people to travel, which of course helped to develop the tourist industry. These journals were written for a non-specialist readership and so brought the observable details of the subterranean biblical flood paradigm to a curious travelling public. The genre that engaged with both the scientific and the aesthetic qualities of caves using the descent narrative, and that ensured the mobility of knowledge, attitudes and logistic information was travel writing.

Travel writing was one method of establishing the paradigm in the popular imagination with the aid of the descent narrative. It had to become a part of the wider culture.

[1] Roy Porter, *The Making of Geology: Earth Science in Britain 1660-1815* (Cambridge: Cambridge University Press, 1977), p. 6.
[2] Bruno Latour *Science in Action* (Cambridge, Massachusetts: Harvard University Press, 1987), p. 225.

Philosopher David Hume made this point in 1740 when he wrote, 'the influence of belief is at once to enliven and infix any idea in the imagination, and prevent all kind of hesitation and uncertainty about it.'[3] This was evident in the poetry and novels of the period. The descent narrative provided the framework to explore what was commonly referred to as 'the hidden recesses of nature,' or as equally significant in the paradigm shift, 'the hidden recesses of the mind.' For the natural philosopher, to descend a cave was to observe and to examine its size, its range and boundaries, the potential for deposits of ore, its hydrology, or the formation of speleothems; the traveller may also have been interested in these phenomena, though it is evident he or she was interested in what happened to the mind when deprived of senses, with the remaining ones intensified, in the darkness, silence and solitude of the cave, staples of the aesthetic of the sublime. Trepidation in the dark, vertical and unstable labyrinth, a space of obscure dimensions, led to common fears of falling, becoming lost and being buried alive. Both the natural philosopher and the traveller were drawn by curiosity; curiosity which provides a momentary glimmer of wonder or which provides an obsessive pursuit of concealed, unknown causes; curiosity which confirms established knowledge or which transgresses the bounds of the legitimate and permissible. The cave visitor experiences displacement as he or she descends into an environment that is barren, impenetrable and solidly enclosed, inside a vast physical object; yet once within their own phenomenal physicality, their subjectivity, appears to dissolve into absence.

Incumbent upon the descender who returns, is the need to tell their tale. The descent narrative is the essential story in the popular imagination of a journey 'to hell and back,' and such a narrator is, perhaps, most recognizably Coleridge's 'Ancient Mariner.' Classical descent narratives attempt to convey what ordinarily cannot be conveyed, a return from the dead, while the eighteenth-century narratives attempt to convey an insubstantial visionary

[3] David Hume, *A Treatise of Human Nature,* ed. by David Norton and Mary Norton (Oxford: Oxford University Press, 2000), p. 289.

experience, or simply what is largely in darkness, what is invisible. They attempt to catch the experience and in so doing they had to, in Samuel Richardson's words, 'write to the moment.'[4] This is evident in the diaries, journals and letters that provide the hybrid form for not only travel writing but for the emerging genre of the novel. The narrators present sublime visions, nightmares and analogies of classical katabatic experiences alongside their observations of the natural environment of the cave. This is the knowledge they return with from the underworld. The early descriptions include the confrontation of superstitious belief, inherited from miners' experiences in the seventeenth century and earlier. This is a mark of the transformation in natural philosophy and the perception of caves and mountain landscapes.

In this chapter, I examine the large archive of traveller's descent narratives from the long eighteenth century to see how they represent the causal and aesthetic properties of the cave, and their own emotive and embodied responses to such an environment. As it is large archive, I have divided the accounts into periods of exploratory intensity. The period from 1750 – 1800 includes so much material it is necessary to divide it further into the regions of the country with known limestone caves.

Cave Travellers' Descent Narratives: 1680 – 1700.

One of the first descent narratives in English was written by Captain Sturmy in 1669, describing his descent of Penpark Hole in Gloucestershire. This was published in the form of an article on natural philosophy by Sir Robert Southwel in the 1683 *Philosophical Transactions*.[5] It is an important founding document in this thesis as it presents the point of separation between

[4] Samuel Richardson, *Clarissa, or the History of a Young Lady,* ed. Angus Ross (London: Penguin, 1985), p. 721.
[5] Robert Southwell, 'A Description of Pen-Park-Hole in Gloucestershire' in *Philosophical Transactions,* 1683, 13, pp. 2 – 6. <rstl.royalsocietypublishing.org/content/13/143/2.2.full.pdf+html> [accessed 21 June 2018]

underworld superstition and subterranean natural philosophy. It is a descent narrative while also acting as a nascent scientific report.

The concept of curiosity is established at the start as Captain Sturmy is described by Southwel as an 'inquisitive' man who felt the 'need' to descend into the cave (Southwel, p. 3). Sturmy writes that he was driven to discover what was 'remarkable' in the cave and, along with a miner, he was initially lowered down on ropes and then climbed down himself into the lower part of the cave, which he has measured as 'thirty-two fathoms underground.' Deep in the cave he writes, 'Here are abundance of strange Places, the flooring being a kind of white Stone, enamelled with Lead Oar, and the pendent Rocks were glazed with Salt-Peter, which distilled upon them from above, and time had putrified' (Southwel, p. 4). Sturmy has only candles to illuminate his way and here stresses the strangeness of the place, lead-ore being familiar to the miner though a 'kind of white Stone,' adds to the uncertainty, as does the description of the calcite stalactites hanging above. The myth of the underworld still affects the miner's perception of what he is experiencing while exploring a distant passage in the cave for ore he 'returns affrighted by the sight of an Evil Spirit, which we cannot perswade him but he saw' (Southwel, p. 3). They leave the cave in the presence of the spirit and, for four days, Sturmy is troubled by a 'violent head-ache.' Southwel picks up the tale and concludes:

> This Captain Sturmy falling from his Head-ach into a Feaver and dying; what from his Death, and the Opinion of an Evil Spirit, nobody was willing to have any more to do with the said Hole from that time to this. (Southwel, p. 4)

Superstition prevails for thirteen years. Miners may have been skilful engineers though they still had their own mining lore. Georgio Agricola's book, *De re Metallica*, from the sixteenth century, was still a handbook for miners in the seventeenth century. Bad fortune can strike the unwary miner, he argued, rock falls, poisonous gas, falling off ladders and falling into sumps and drowning. However, these are brought about by chance or physical

carelessness. Another danger he alludes to is that of the presence of demons: 'In some of our mines, however, though in very few, there are other pernicious pests. These are demons of ferocious aspect. Demons of this kind are expelled and put to flight by prayer and fasting.'[6] Agricola's book attempts to bring order to a world of chaos, not just in engineering but in the best and most effective method of driving out demons. This is the underworld that the seventeenth century inherits, still a wild displaced region of superstition as well as a place of great utility.

Southwel does not leave the narrative as prey to superstition. In 1682, while surveying the coast of England, a friend, Captain Collins, visits Southwel. Southwel tells him of Penpark Hole and the death of Sturmy. Collins gathers his crew and with lines, candles, torches and a speaking trumpet descends the cave, and, as Southwel writes, 'What he found does much lessen the Credit and Terror of this Hole' (Southwel, p. 4). Collins and his men spend two days exploring the hole and they measure every passage they can access in yards. The description is factual of the rock, the air, the water, confirming Sturmy's experiment, and they 'observed all things' (Southwel, p. 5). They conclude by drawing a survey of the cave, probably the first survey of a natural cave in Britain, and the 'Evil Spirit,' should it exist, is exorcised by mathematics. This article is a landmark in the representation of cave exploration in Britain as it confronts superstition and establishes the natural philosophy of the cave environment.

Though this early exploration is enacted by miners and mine engineers, the mines in limestone areas are largely natural caves with mined extensions along the mineral veins. This is interesting in that those descending and writing their narratives were not natural philosophers or poets but engineers. Their narratives present us with a practical exploratory perspective. In 1681, a letter on cave exploration was published in *Philosophical Collections*,

[6] Georgio Agricola, *De Re Metallica* trans. Hoover, H.C. (London: Mining Magazine, 1912; repr. Forgotten Books, 2012), p. 25.

written by John Beaumont. It was an account of a descent into Lambs Cavern in the Mendip Hills of Somerset. Beaumont is responding to a request from the editors and so must have been known for his descents into caves and he starts with a description of Ookey Hole (Wookey Hole) which would be called a show-cave today. This cave was very popular then as he writes that it is 'much resorted to by Travellours.'[7] Beaumont describes the size of the cave and its utility, such as the volume of water to drive a mill, the number of trout and eels found in the river and the presence of metal ores. His utilitarian approach is evident when he comments on the speleothems found there: 'people talk much of several stones there resembling men and other things, but I find no curiosity in them, being only lumps of common spar without any regular features' (Beaumont, p. 3). Beaumont is not interested in curiosity as novelty, he is looking for things of use in what is an unexploited environment. He mentions Cheddar Cave though says it has nothing peculiar in it and has not been mined. He refers to Agricola's *De Re Metallica* as a guide in his own search for ore which takes him on a descent into the unexplored vaults of Lambs Cavern in Mendip.

Beaumont describes the passage through its size in fathoms (a measure of six feet) and how in places it is 'so low that a man has much ado to pass by creeping' (Beaumont, p. 4). The cave is perceived and defined through Beaumont's size. His measurements of the cave's proportions are drawn from his own bodily measurements (fathoms and cubits) where the passage opens by sight using only a candle to see. They reach the unexplored cavern which opens out of the narrow passage before them: 'by the light of our Candles we could not fully discern the roof, floor, nor sides of it' (Beaumont, p. 4). Here, even with familiarity of caves in pursuit of resources, Beaumont is still disorientated in the dark as the cave expands beyond his senses. The miners with him will not descend the rope into the seemingly boundless

[7] John Beaumont, 'A Letter Giving an Account of Ookey-hole and other Subterraneous Grottoes and Caverns in Mendip-hills in Somersetshire' in *Philosophical Collections* 2 1681, p. 2.

darkness, even for double their salary, so he ties himself to the rope and has them lower him down. He writes of his descent:

> Being down about two Fathom I found the Rocks to bear away from me, so that I could touch nothing to guide myself by, and the rope began to turn round very fast, whereupon I ordered the Miners to let me down as quick as they could, and upon the descent of 12 Fathom I came to the bottom. (Beaumont, p. 5)

The article is for the most part a report of the contents of the caves but at this point it becomes a descent narrative of adventure, disorientation and physical danger. It is the one part of Beaumont's embodied journey where his senses fail him and narrative is the only way he can convey how. It is telling that when he reaches the floor of the cavern he returns to his empirical self as he unties from the rope and searches 'for what Earths and Stones I found in it' (Beaumont, p. 7). As with the Southwel article, Beaumont blends the report with narrative as the challenging physical environment must be passed through to gain the observations he records.

Support for the paradigm of the 'Universal Deluge' and cave formation, is expressed by Charles Leigh in his *The Natural History of Lancashire, Cheshire, and the Peak in Derbyshire* in 1700, where he takes specific objection to John Woodward's hypothesis of the settling out of the debris of the earth after the flood through the agency of specific gravity, not the agency of God. Leigh's book is not a guide to the Peak District caves though does act as one as his description of Poole's Hole and Eldon Hole would certainly attract the curious: 'These perhaps are the most amazing Vaults in the Universe that are Natural and not Artificial. Eldon Hole is the most terrible Chasm that I ever yet beheld.'[8] By aligning his views with the Royal Society publications, as well as Burnet's hugely popular book, Leigh gives his natural history authority

[8] Charles Leigh, *The Natural History of Lancashire, Cheshire, and the Peak in Derbyshire* (Oxford: [n. pub.], 1700), p.187.

and authenticity. These two caves, along with Peak Cavern, or the Devil's Arse, partly make up the Seven Wonders of the Peak eulogised by Charles Cotton in his poem. Leigh ties the supposed formation and hydrology of these three 'show' caves into Burnet's theory, which aligns it with Southwel and Beaumont's observations, and with Cotton's account.

The further exploration of caves during this period is evident in two letters published in *Philosophical Transactions*. One is an anomaly in that it was written in 1674 though only published 72 years later in 1746, long after the writer, J. Durant, and the recipient, Robert Boyle, had died. Durant describes what is now thought to be Fairy Holes in Weardale, North Yorkshire, and the presence of 'odd metalline Ore':

> By a little Hole creeping into the side of a vast Mountain, is entered a spacious Cavity, chambered with Walls and Pillars of decident lapidescent Waters; the Hollowness in some Places being pervious further than any yet has adventured to discover; the Darkness of these Caverns requiring the Help of Candles, which are often extinguish'd by the dropping Water.[9]

Durant is driven by curiosity to explore what is a challenging cave (though much of it has since been blasted away by quarrying), not out of novelty but in the pursuit of knowledge. The unknown cave clearly stretches way on beyond his limit, though the beauty of calcite speleothems and the possibility of obtaining a rare ore motivate him to go further. He wishes to join Boyle and cast in 'my Mite to that Treasury of Knowledge in Things natural,' through both his and Boyle's 'indefatigable Labours' (Durant, p. 223). The Royal Society editors must have thought this was a timely display of enthusiasm in cave exploration and that no one had been back to further Durant's explorations.

[9] J. Durant, 'A Letter from Mr. J. Durant to the Honourable Robert Boyle, Esq; F.R.S. concerning a Subterraneous Cavern in Weredale' in *Philosophical Transactions,* 1746, 44, pp. 221 – 223, p. 223. < rstl.royalsocietypublishing.org/content/44/480/221.full.pdf+html > [accessed on 21 June 2018]

Charles Lucas, in a letter to the Royal Society's Hans Sloane in 1736, published in 1739, concerning the exploration of Kilcorny Cave in County Clare, Ireland, presents the local lore concerning the cave. The cave is a passage through the earth to Australia; it is a stud of fine though mysterious and elusive horses that belong to O'Loghlen, the king that lives under the hill. As with other Royal Society correspondents Lucas dismisses these as 'fabulous, romantic Tales.'[10] Lucas's description of the cave is a demystification through measurement and a systematic observation of its peculiar hydrology, as it floods spectacularly though irregularly. He refers to others entering the cave and marking their way with a thread or by dropping hay for a guided return, this he dismisses as unnecessary as 'there being no windings or Chambers throughout of any Extent.' His approach to exploring the cave is methodical, rational and empirical, and like Durant, Collins and Beaumont, he has no fear of the unknown. He concludes his letter: 'I have been very cautious in saying more than any Man may see there' (Lucas, p. 364). Lucas shows boldness in his exploration, though as the knowledge of caves is a new and emerging form of knowledge, he is not willing to commit himself to unsupported speculation.

Perhaps the earliest substantial account of a cave visit is that made by the clergyman, James Brome in 1694. Brome's travel journal was apparently stolen and published without his consent as *An Historical Account of Mr Rogers's Three Years Travels*. Brome published his own account in 1700, with a second edition in 1707, to put the record straight, as *Travels over England, Scotland and Wales*. Brome described the pirated copy as 'so wretchedly Curtail'd, so horribly Imperfect, and abominably Erroneous,' and the people responsible were 'such vile Poltroons, and Scandalous Undertakers,' the main culprit remained 'a mysterious Cheat,

[10] Charles Lucas, 'A Description of the Cave of Kilcorny in the Barony of Burren in Ireland' in *Philosophical Transactions*, 1739, 41, pp. 360 – 364, p. 362. <rstl.royalsocietypublishing.org/content/41/456/360.full.pdf+html> [accessed on 21 June 2018]

which has for some time walked in Darkness.'[11] This does suggest that there was an eager market for travel writing in Britain that was not being exploited, and publishers were willing to plagiarise what texts they could get hold of to meet the demand. In the preface to Brome's own account, he says that travellers are better placed to explore Britain rather than more remote nations, as this country has comparable phenomena with anywhere; he gives examples of Ochy Hole near Wells and Poole's Hole near Buxton in comparison to Virgil's Grotto and the Sybil's Cave in Italy. The classical references feature throughout the journal as Brome includes the opinion that the 'noble Trojan, Brutus' founded Britain, and that London was initially known as 'New Troy.' Once this Virgilian representation of his journey is established, the descent narrative is inescapable. Brome also hints at a more English journey, a Chaucerian pilgrimage, as he leaves London with his friends: 'when the Spring had rendered the Roads passable and the Country was a fitting Entertainment for Travellers' (Brome, p. 1).

Brome's journal addresses natural philosophy as well as history and culture, and, as such, it partakes of and adds to the paradigm discourse of the time. Elm trees found buried deep underground and fossil sea shells found in rock on the top of mountains are products of the 'General Deluge.' Brome refers the reader to the work of the natural philosopher, John Ray, one of the key authorities in the debate with Burnet. He also adds to the frustration of Robert Boyle by writing about Ochy Hole as 'the most remarkable, the most admirable piece of Nature's Workmanship, in our English Nation' (Brome, p. 36). Boyle urged writers to avoid giving 'Nature' agency, rather they should attribute natural phenomena to divine agency. This was not a minor irritation for philosophers such as Boyle, giving 'nature' agency fundamentally undermined the belief in the divine creation of the earth.

[11] James Brome, *Travels over England, Scotland and Wales* (London: Gosling, 1707) Preface to the Reader.

The descent of Ochy Hole is presented through an appeal to the senses, sublime apprehension and the attraction of curiosity. Only candles are available to light Brome's way and they give very little light. Brome suffers the 'deprivation from the least glimmering of light,' and the cave is so dark that 'nothing sure but Tartarus itself could resemble it' (Brome, p. 36). The classical analogy is further made as they progress in the dark: 'we though certainly we were arrived upon the Confines of the Infernal Regions, or else were got into some such dismal place as the Italians tell us the Sibylline Grotto is.' The darkness takes on animated force as it 'seizes' upon them, with 'dreadful apprehensions.' (Brome, p. 36) The start of the descent typically begins with the deprivation of senses and this is intensified further down in the descent when they realise that sound does not travel far in the cave; even the loudest of sounds, a gunshot, for example, cannot be heard any distance away. A mile underground, Brome reflects, no one will hear their cries for help. It is down here that Brome recognises what will become key elements in the theory of the sublime: darkness, silence and solitude. It is also through this sensory deprivation and physical struggle, a sense of disorientation, that curiosity and the uncanny are imagined: 'after some more difficulties in our Passage, and no less dangerous than before, we came into another part of the Cave more strange than any we had yet seen' (Brome, p. 39). It seems that Brome's strangeness is more subjective than objective; it is his experience and perception that is strange not the rock covered in calcite.

The katabatic journey requires a return and Brome's guide tells him he is a mile underground, in a 'darksome Labyrinth,' where it is impossible he should ever find his way out alone: 'we began to consider how we should return, and get out safe again from this place of Horror and Darkness to the Regions of Light' (Brome, p. 41). Like Aeneas with his guide, the Sybil, or Dante with Virgil to guide him, Brome and his guide make it back to the surface, and like both Aeneas and Dante the return journey is glossed over even though at the outset it is given huge significance; the assumption is that if you are favoured by the gods then return is a foregone conclusion.

Ochy Hole is not the only descent narrative in the book; Brome travels to witness the Seven Wonders of the Peak in Derbyshire. In the Devil's Arse (Peak Cavern) he imagines he hears in the sound of the stream as it sinks, '*ne plus ultra*' – this is the limit, the end, though the guide claims there is still much to discover down there. Brome responds, 'I should be extream loath, were it to purchase the Fame of a Drake, or a Frobisher, to seek out a New-found-Land in so dismal a place, which, both by its Name and Nature, hath so near a Relation to the Diabolical Regions' (Brome, p. 82). Framing himself in the context of two of England's greatest explorers, Brome's visit to the cave with a guide is imaginable though exploring alone is beyond him. When visiting nearby Eldenhole (Eldon Hole), he further stresses the limitless dimensions of the 'immense profundity,' the 'bottomless Abyss,' the 'Avernal Pit,' the 'Bowels of the Earth.' No one has descended it and it remains beyond comprehension: 'We are as much in the Dark, concerning its Nature, as we were before' (Brome, p. 83). Brome's observations convey how far he is willing to go in his enquiries, and this is not far. He does not wish to be a subterranean explorer, and his degree of curiosity appears slight when he visits Poole's Hole and says it resembles Ochy Hole though is not as remarkable. It is full of 'animal shapes' formed from calcite, not as interesting as he has seen it all before. These are novelties soon overlooked, not objects of rational enquiry.

Cave Travellers' Descent Narratives: 1700 – 1750.

An early descent narrative with a strange origin was written by the philosopher, George Berkeley when still a young man. Berkeley's description of his descent into Dunmore Cave in Kilkenny, Ireland, was written seven years after the event and never published in his lifetime; though it is believed by his editors that the visit was made when he was an undergraduate, perhaps as early as 1706, there is no mention in the text of the date of the descent. He read widely in the cave literature he could find but found no record of any descent of this cave and so produced this lengthy account, though, not being published, this too would prove difficult

to find. Berkeley must have intended to publish the account as he refers to the reader throughout, even apologising to the 'curious reader' for his vague descriptions of the passage and the lack of precise measurement; his account is drawn from memory.[12] Berkeley presents the first account of a descent of Dunmore Cave, a cave that later will be the site of Adam Walker's experiment with carbonic acid and limestone. An experiment that marked the early understanding of limestone solution and the beginning of cave and karst science.[13]

Berkeley begins his descent narrative with emersion in darkness: 'We bad farewell to daylight, which was succeeded by a darkness that fills the hollows of this capacious cavern' (Berkeley, p. 76). The darkness is given agency; it is a force that 'fills' and conceals the 'hollows' of the cave. As his sight is reduced he is immediately impressed by the 'profound silence,' which is intensified by the singular sound of drops of water falling from the ceiling of the cave. Berkeley writes that what speleothems he sees appear as lumps of rock, though others perhaps see in them whatever their imagination suggests to them: 'the petrified water stamped with the impressions of their own brain' (Berkeley, p. 77). If people were impressing their own ideas upon objects in the cave, the cave was impressing itself upon Berkeley: 'the dismal solitude, the fearful darkness, and vast silence of that stupendous cavern have left lasting impressions in my memory' (Berkeley, p. 79). Just as the darkness has been given an agency that fills the space of the cave, the silence is given spatial dimensions, the same dimensions that have been filled by darkness and emptied of life. Berkeley's focus on the senses does not only address sight and sound through the fear of the darkness and its attendant silence and solitude, he also addresses the sense of touch through the fear of being buried alive and the fear of falling. He describes the shattered rocks that hang above him ready

[12] George Berkeley, 'Description of the Cave of Dunmore' in *Works of George Berkeley* 4 vols, ed. by A. C. Fraser (Clarendon Press, Oxford, 1901), IV, p.74.
[13] Adam Walker, 'A Letter to Charles Morton, MD. Secretary of the Royal society; containing an account of the Cavern of Dunmore park, near Kilkenny, in Ireland' *Philosophical Transactions,* 1773, 63, pp. 16 – 19. <rstl.royalsocietypublishing.org/content/63/16.full.pdf+html> [accessed on 21 June 2018]

to fall; he sees collapsed rock on the floor and has been told by other visitors of how they heard the distant rumbling of falling rocks within the cave, and further in he observes a vast rockfall that has blocked the passage. At one point in his journey, the roof lowers so that he must crawl on his knees and his hat brushes against hanging rock above; this all gives him 'terrible apprehensions.' With only a flickering candle to light his way, he crawls and creeps in the dark and sees to his side, 'a terrible hiatus, that by its black and scaring looks seemed to penetrate a great way into the bowels of the earth' (Berkeley, p. 81). The only way forward is blocked by calcite speleothems; a move to the left would see him plunge into the abyss, so he cautiously returns the way he came back to the surface and daylight.

This is a psychological as well as a physical experience for Berkeley and he shapes the experience in the form of a descent narrative, difficult to avoid as he descends and then re-ascends; it must always be a round-trip unless the visitor intends, or is forced, to stay down there. However, Berkeley's descent includes the leaving of his three dogs barking near the entrance in the dark, like the three-headed dog, Cerberus, that stands guard in Hades; he meets the 'shades' of the dead at the bottom of the cave when he discovers the skeletons and skulls of several people of unknown origin; and he almost stumbles down the final abyss into Tartarus before making his exit. He blends this with descriptions of natural history and, unlike Leigh, praises Woodward's theory of the formation of the subterranean earth. This is a piece of writing that would, had it been published, have attracted readers out of curiosity, wonder and novelty, yet as with the other texts it is at pains to educate and inform the reader as well.

Whereas Berkeley's early descent narrative of Dunmore Cave remained unpublished, a travel journal that included a descent of this important cave was published in 1746 by William Rufus Chetwood. This confirms the growing public knowledge of significant caves and their importance on tours, particularly Dunmore. Chetwood compares Dunmore Cave with the 'Seven Wonders of the Peak,' clearly already celebrated as major tourist attractions, and

claims it is better than all of them combined. Chetwood also writes about bringing out of the cave several speleothem souvenirs; seen as an act of wanton vandalism today, then it showed an interest in rare and singular forms of natural history and in acquiring private collections of 'curiosities.'[14] Like Berkeley, he shapes his experience into a descent narrative: 'We were informed, that two miles from the Mouth was a Well of Wonders; but indeed, none of us had Curiosity or Courage enough to travel so far in this subterranean Road […] When we came out, we thought we had abandoned the Regions of the Dead, to draw the Air of Paradise.'[15] His guides tell him of all the romantic legends of the place, and all the names given to various features. There is a standard tour that appears to include sections that require a greater level of commitment, perhaps asking the visitor how far their curiosity, and courage, will take them.

The travel journal that reached a readership much wider than Brome and Berkeley, and showed how popular domestic travel was becoming, was Daniel Defoe's three volume*, A Tour through the Whole Island of Great Britain*, published initially between 1724 and 1727, as a series of letters. Samuel Richardson obtained the rights to the book and published the second edition in 1738 and four more editions through the 1740s. It was Defoe's most popular book, along with *Robinson Crusoe*. Both books, interestingly, are accounts of journeys around an island to discover the landscape and its resources, and both include descents into caves.

Defoe visits the caves that partially make up the Seven Wonders of the Peak in Derbyshire and dismisses most of them as 'imaginary wonders' not worth the visitor's curiosity.[16] He claims that wherever he goes the locals are very keen to show him everything they can, insisting they are all 'wonders.' For Defoe, curiosity can be fleeting but the idea of a 'wonder' appears to be illusory, little more that hyperbole. He avoids the imaginary wonders

[14] Nigel Leask, *Curiosity and the Aesthetics of Travel writing 1770 -1840* (Oxford: Oxford University Press, 2002), p. 28.
[15] William Chetwood, *A Tour through Ireland. Wherein the Present State of that Kingdom is Considered* (Dublin: Wilson, 1746), p. 193.
[16] Daniel Defoe, *A Tour through the Whole Island of Great Britain,* ed. by Pat Rogers (London: Penguin, 1971), p. 462.

in place of finding 'real' wonders for himself he will judge what is extraordinary. This is an interesting inversion of what was considered trustworthy at the time; travel writers were dismissed for their invention, exaggeration and fantasy, yet Defoe is blunt in his dismissal of the local people's beliefs and the validity of his own. He writes about what he perceives as 'just curiosity,' when he visits Pool's Hole:

> The wit that has been spent upon this vault or cave in the earth, had been well enough to raise the expectation of strangers, and bring fools a great way to creep into it but is ill bestowed upon all those that came to the place with a just curiosity, founded upon ancient report; when these go in to see it, they generally go away, acknowledging that they have seen nothing suitable to their great expectation, or to the fame of the place. (Defoe, p. 469)

Defoe acknowledges, as does Chetwood, the reputation that the 'wonders of the peak' have acquired, possibly through the celebratory poem of Hobbes and Cotton.[17] Defoe is a sceptical traveller and will not be subject to what he perceives as fashionable curiosity and received wonder.

One 'wonder' that Defoe discovered was a woman living in a cave with her family of four children, her husband being a lead-miner. This becomes an observation on morality and humility as the woman appears happy in her simple existence; she is secure in her cave (Defoe, p. 463). Compared to the other 'wonders' that convey nothing curious, her life is extraordinary. It is in *Robinson Crusoe*, published in 1719, that Defoe first considers life in a cave when he has Crusoe, gripped with fear over the possible attack from the cannibals, discover his cave, his safe retreat: 'I found, to my unspeakable consolation, a mere natural cave in the earth, which went in a vast way.'[18] After overcoming his fear of the trapped goat

[17] Charles Cotton, *The Wonders of the Peak* (Nottingham: Thomas Collyer, 1744).
[18] Daniel Defoe, *Robinson Crusoe* ed. by Angus Ross (London: Penguin, 1985), p. 182.

in the cave, he explores it: 'going into this low place, I was obliged to creep upon all fours, as I have said, almost ten yards; which, by the way, I thought was a venture bold enough, considering that I knew not how far it might go, nor what was beyond it' (Defoe 1985: p. 184). Here the fictional Crusoe is the cave explorer, going beyond the known and observable, crossing the threshold into the subliminal subterranean; he takes on a role seen in Sturmy, Collins and Beaumont, and perhaps Berkeley, though notably not in Brome.

On his tou*r*, after he has left the woman who lives in a cave, he witnesses another 'wonder' when he looks down a deep and narrow mine entrance: 'we were agreeably surprised with seeing a hand, and then an arm, and quickly after a head, thrust up out of the very groove we were looking at' (Defoe 1971: p. 465). Defoe's shock and surprise at the gradual fragmentary appearance of the 'subterranean creature,' body part by body part, is reduced when he moves his horse nearer the hole and sees the wooden stemples across the shaft and then the complete identity of the man who has climbed up out of the earth. This shifting perspective is apparent in Defoe's account of what he sees and the trust he has in his own observational judgments rather than those of others. For Defoe, things are not always what they first appear to be; fragments eventually merge to create a sense of the whole. Defoe's curiosity is about sustaining or altering the position of the observation to see and understand more.

Defoe's challenge of the Peak's 'wonders' continues with his visit to Pool's Hole, 'another of the wonderless wonders of the Peak,' and Peak Cavern (The Devil's Arse), where 'we must search narrowly for anything in it to make a wonder, or even anything so strange, or odd, or vulgar, as the name would seem to import' (Defoe, p. 473). The validity of Defoe's criticism of the 'wonders' has been brought into question, however. In 1746, Samuel Simpson describes a visit to both these caves, though whether he descended them is uncertain, as he states on the title page of his book that the material within it is partly complied by other

authors and the bulk of his descriptions are drawn directly from Cotton's poem.[19] This is picked up by the novelist Thomas Amory who claims that Defoe never visited the caves either; he too merely copied the writing of Cotton.[20] Simpson writes that none can enter Pool's Hole without a guide and then describes everything he is shown by them, commenting that, 'when your Mind is busy in observing those Curiosities, you be not surprised with a stumble into a Ditch, as the Star-gazing Philosopher was' (Simpson, p. 240). The 'curiosities' are the same momentary objects of 'wonder' that Defoe dismisses. Similarly, with Peak Cavern, Cotton is still the guide for Simpson, though he does conclude with the possibilities of more cave passages beyond the sump; 'If these waters could be passed over, some new discoveries might be made; but such fruitless Attempt can allure no Adventures, and so it is like to remain a Terra incognita, if any be there, for ever' (Simpson, p. 245). Both Defoe and Simpson's tours to the caves of the Peak fulfilled a requirement for a growing market in guides for independent travellers, including a substantial interest in caves.

Despite his scepticism about the other wonders, Defoe perceives Elden Hole to be a genuine one, and, as this cave is a vertical shaft from the surface, he cannot enter it. It is this necessity of the imagination to attempt to grasp the scale and dimensions of the hole that make it a 'wonder,' a suitable object of justifiable curiosity. Defoe describes the hole as 'a frightful chasm, or opening in the earth,' 'it goes down perpendicular into the earth, and perhaps to the centre,' 'it has no bottom, that is to say, none that can yet be heard of' (Defoe, p. 477). It is this disorientation when confronted with a dimensionless space that necessitates the observer to imagine. Defoe concludes, 'What Nature meant in leaving this window open into the infernal world, if the place lies that way, we cannot tell. But it must be said, there is something of horror upon the very imagination, when one does but look into it' (Defoe, p.

[19] Samuel Simpson, *The Agreeable Historian, or the Compleat English Traveller* (London: Walker, 1746), p. 240.
[20] Thomas Amory, *The Life of John Buncle, Esq.* 2 vols (New York: Garland Publishing, 1766; repr. 1975), I, p. 367.

478). Defoe acknowledges the unknowable extent of the cave systems beneath the earth, the dimension of phase space. He is conscious of the cave by its opening only, its effect on the surface.

These early accounts of descents present caves as strange, unfamiliar and dislocated places where the traveller confronts their fears of darkness, depth and isolation, as well as an embodied and often fraught encounter with the earth and the extraordinary objects found down there. This encounter generates what Stephen Greenblatt has called 'resonance and wonder,' the power of such objects to conjure thoughts of unknown natural forces and to arrest the viewer with a sense of the object's uniqueness.[21] Such engagement led to an intensification in cave travel in the second half of the eighteenth century, perhaps driven by a search for a more authentic form of travel beyond popular rural tourism. The travel journals suggest it was driven by the desire for to explore this dislocated alien environment, to engage in physical dangers and hardship and to descend into the earth to confront and imagine the natural forces that formed it.

Cave Travellers' Descent Narratives: 1750 – 1800.

The number of travel journals and letters incorporating descent narratives in this period is so great that for coherence, I have organized them into cave districts.

1. The Peak District, Derbyshire

An account that readily combines the descent narrative excitement with scientific inquiry is that of the natural philosopher, John Lloyd, who in 1771 set out to measure the depth of Eldon Hole by descending the shaft himself. Lloyd begins his letter to the Royal Society with, 'Having often heard, and seen, several accounts of the unfathomable depth of Elden Hole, in

[21] Stephen Greenblatt, *Learning to Curse: Essays in Early Modern culture* (London: Routledge, 2007), p. 228.

Derbyshire, and being in that neighbourhood, I was inclined to make what enquiries I could about that noted place.'[22] This unfathomable depth was noted by Defoe in the previous section. Lloyd is a natural philosopher who, like Defoe, is sceptical about such myths and knows it must have a base, one that can be rationally measured. The first thing he discovers is that it does have a depth and the two workers he meets say they have been down to the large cavern at the base. Lloyd is not the only visitor to discover how locals have descended the pothole; Edward King, in a letter in the same issue of *Philosophical Transactions*, writes that in a conversation with the wife of a miner, she tells him her husband descended the hole four years previously. They had long known it was not 'bottomless' or 'unfathomable' though it appears they were not consulted, or listened to, and the myth prevailed. This is an example of how power and legitimacy affect the mobility of scientific knowledge; the miners have neither and so their experience and knowledge remains localised (Lloyd, p. 258).

Lloyd's descent is something of an anti-climax, given the persistence of the unfathomable depth. He is lowered down by eight men and measures the distance to the floor of the shaft as 'sixty-two perpendicular yards,' and a further twenty-five yards to the foot of the adjoining chamber. He cannot observe the ceiling of the chamber as he has insufficient light to do so, and there are no 'particular curiosities' in the cavern worthy of mention (Lloyd, p. 252). All Lloyd can observe is rock and darkness, though his curiosity to try and observe more in a passage high above him, leads him into difficulty: 'At the upper part I perceived a small hole, or cleft; but could not, without being in danger of my life, get at it; and I found great difficulty in coming down again' (Lloyd, p. 254). This is the approach of Amory's fictional character, Buncle, who risks all to discover and explore the unknown. When he has finished exploring the large cavern, 'having satisfied my curiosity,' Lloyd give the signal to the men

[22] John Lloyd, 'An Account of Elden Hole in Derbyshire' in *Philosophical Transactions,* 1771, 61, pp. 250 – 265. <rstl.royalsocietypublishing.org/content/61/250.full.pdf+html> [accessed 0n 21 June 2018]

above to haul him back up, and it is here that the inevitable enactment of the descent narrative continues:

> Once more fastening the rope to my body, I gave the signal to be drawn up, which I found to be a much more difficult and dangerous task than my descent, owing to my weight drawing the rope into clefts, betwixt the fragments of the rock, which made it stick; and to my body jarring against the sides, which I could not possibly prevent with my hands. Another circumstance also increased the danger, which was, the rope loosening the stones over my head, whose fall I every instant dreaded. (Lloyd, p. 254)

Lloyd appears helpless in his return to the surface; he is literally in the hands of the miners above. This is an embodied journey; it is a physical and dangerous engagement with rock. It also appears from his description that he went down alone, though at the end of his letter he refers to the miners 'who went down with me.' It is the miners who are facilitating the work of the natural philosophers. Attached to Lloyd's and King's letters is the survey or illustration of Eldon Hole, showing conclusively that it does have a base.

Lloyd's scientific expedition to Eldon Hole is a remarkable descent narrative with a struggle to return to the surface. A journal that includes an even more dramatic descent narrative is that of Sir Richard Sulivan who in 1780 visits the Peak. Sulivan who, like Simpson before him, is on the standard tour and is guided by Charles Cotton's poem when in Pool's Hole. In Peak Cavern, he follows the tourist route, with miners employed to sing to the tourists in the candle-lit caverns, though the point of interest mentioned by Sulivan is the attempt by miners to extend the length of the cave through explosives and connect it to the nearby Speedwell Caverns, which are known to share the same subterranean stream.[23] Though Lloyd and other miners had descended Eldon Hole to the foot of the shaft at least nine years

[23] Richard Sulivan, *Observations made during a Tour through Parts of England, Scotland, and Wales in a Series of Letters* (London: Becket, 1780), p. 163.

previously, Sulivan describes a 'tremendous yawning gulph, bottomless as it is supposed' (Sulivan, p. 157). He hears nothing but the sound of rock upon rock as stones are hurled down. The German traveller, Carl Moritz, visits Eldon Hole in 1782 and acknowledges it does have enormous depth and a base. He throws a rock down the shaft and hears it banging from wall to wall until it strikes the bottom. He comments on how the locals believe in fairy-tales.[24] Sulivan is not a man for fairy-tales, though he was driven by something beyond reason: 'the spirit of curiosity had warped our rational faculties; danger had become familiar to us, and we therefore determined upon a plan that a wiser man would have shuddered at the idea of' (Sulivan, p. 166). It is not Eldon Hole he descends but a nearby mine shaft that has opened into a natural cave, the Speedwell Caverns system. He asks the local miners to take him down. This is a development of the tourist industry that we get a hint of with Defoe, and witness its reality with Lloyd. As Lloyd has shown, there is, at this point, an appetite for a much more adventurous form of caving beyond the conventional tourist trail. The miners, though reluctant at first, agree to take Sulivan and his friends into Speedwell, and Sulivan records a classic descent narrative.

After dressing like a miner, and taking on a degree of their identity, Sulivan is taken to the shaft they must climb down by way of wooden stemples wedged across the void: 'Imagination can scarcely form a descent more perilous than this was' (Sulivan, p. 167). After passing through several chambers, Sulivan begins to describe a journey through bodily sensation rather than just sight and sound, as most other narratives have done. They reach the unknown and must force their way through narrow gaps and then crawl painfully on their hands and knees through mud and sharp rocks for a mile. Deafened by the roar of water, Sulivan reaches the subterranean river and plunges in to his waist; his candles are extinguished and the party is left in complete darkness. This is combination of sensory deprivation and

[24] Carl Moritz, *Journeys of a German in England,* trans. by Reginald Nettel (London: Eland Books, 1965), p. 169.

intensification; the cold shock of the water and the difficult terrain exhaust the party. Sulivan avoids falling down a shaft by catching his already wounded knee on a jutting rock and doubts he can exit the cave safely:

> The retreat accordingly began; but no anguish could surpass the excess of torment I was in. Often did I wish to remain where I was; no succour or assistance could be given me: every man was painfully busied in the charge of his own safety. At length, having almost worn out the other knee, and torn both my sides and back by forcing myself in those positions, I was compelled to call out for help, as we happily came to the first opening where I could be raised. Languor and faintness from what I had suffered, had totally deprived me of my strength. (Sulivan, p. 169)

Sulivan of course makes it back to the daylight though wishes never to descend again, never again 'to be so unpardonably led by curiosity as to tempt destruction,' as a falling stone might bury him 'in eternity for ever.' Sulivan presents the reader with the most sublime of descent narratives. He includes both silence and the deafening roar of water, darkness, solitude, fear of falling and premature burial.

Further evidence of efforts to find and explore new caves continued to appear. In 1785, William Thomson describes how a man had, four years previously, tried to dive through the sump at the end of Peak Cavern, before it had been blown open by explosives: 'With this desperate resolution he plunged in with his feet foremost; but, as was expected, struck his head against a rock. In this state, he remained a considerable time, till at last he was dragged out by the head.'[25] Thomson is told this by the guide who leads him into a new cavern he has forced entry. Thomson retreats at the first difficulty and writes of the guide: 'This man is so

[25] William Thomson, *A Tour in England and Scotland, in 1785. By an English Gentleman* (London: Robinson, 1788), p. 36.

eager in pursuit of new wonders in this cave, that I should not be in the least surprised to hear of his being buried or drowned in it' (Thomson, p. 36).

The extent of the subterranean exploration is addressed by James Pilkington in his two-volume work, *A View of the Present State of Derbyshire*, published in 1789. He appears to be familiar with the above accounts of cave visits and writes of them:

> Some of these accounts have been given with a tolerable degree of accuracy, while others have been set off with such exaggerated circumstances of terror and astonishment as cannot fail of raising false notions of these subterraneous situations.[26]

Pilkington addresses the accounts of Thomson in Peak Cavern and Lloyd in Elden Hole, and with supporting testimonies of local miners acknowledges their accuracy. However, the same cannot be said for Sulivan and his epic descent narrative in Speedwell Caverns; though not mentioned by name, Pilkington gives a much more measured and sober account of the cave that Sulivan passed through. He gives a remarkable description of the passage in all its varied morphology with precise measurements.

Pilkington goes in search of caves beyond those on the tourist trail and as he further discovers the extent of the limestone beds in Derbyshire the more he realises the extent of possible caverns and shafts: 'Now that this opinion is just and well-founded has been sufficiently proved by the actual discovery of a long series of each betwixt Elden Hole and the celebrated cavern near the above town' (Pilkington, p. 72). He writes that miners have estimated the gap between Eldon Hole and Peak Cavern is between 400 to 500 yards. They understand the hydrology and are convinced they know where the water sinks and where it

[26] James Pilkington, *A View of the Present State of Derbyshire* 2 vols (Derby: Drewry, 1789), I, p. 62.

passes through. He also searches the rest of Derbyshire, finding caves near Eyam (Carlswark Cavern and Bamforth Hole).

The epic narrative of Sulivan and the measured reason of Pilkington both suggest the expansion of cave tourism in Derbyshire away from the conventional 'Wonders of the Peak.' This can be seen in the journal of Scottish clergyman William MacRitchie who travels to Derbyshire after visiting many of the caves in Yorkshire. He visits Pool's Hole and Peak Cavern yet it is the mines and the natural caverns therein that he is excited by. The levels that Pilkington describes as being driven into the natural caverns of Speedwell to help drain the water is now a tourist boat ride, and MacRitchie experiences it with the boatmen's practised candle illumination of the caverns and the songs they sing within them. Like Sulivan before him, MacRitchie must dress as a miner for his descent into the Blue John Cavern:

> I descended after my two guides into the bowels of the mountain for hundreds of yards through narrow, difficult and dangerous passages, sometimes crawling, sometimes stooping, sometimes standing, sometimes sliding through wet clay and red ochre, till we came at last to the bottom of one of the most beautiful Caverns in nature.[27]

Once more the practised miner-guides illuminate the cavern and burst into song, enchanting the tourist, MacRitchie. They take him to Elden Hole and tell him that it has never yet been descended and that its depth has not been measured. Perpetuating the myth is better for the tourist trade. Tourism had generated a guide to the Castleton area by the end of the century that included Peak Cavern along with Eldon Hole and the mines of Odin, Blue John and Speedwell, written by J. M. Hedinger. This like the work by Pilkington, addresses the geology

[27] William MacRitche, *Diary of a Tour through Great Britain in 1795* ed. by David MacRitchie (London: Elliot Stock, 1897), p. 59.

of the area and the presence of various ores and minerals.[28] It suggests that Castleton had enough hidden recesses of nature and curiosities and that there was no need to combine these attractions with the other 'Wonders.' The French traveller, Bartholome Faujas Saint-Fond, visited the Peak in 1799 to study the limestone geology and dismissed Pool's Hole near Buxton; it contains little of interest and most of the speleothems have been damaged and carted out as souvenirs and 'curiosities.' The guides insist on telling Saint-Fond that the speleothems represent objects and animals, as in 'chairs' and 'horses.' Saint-Frond writes that 'the power of the imagination and habit, will concur in maintaining this absurdity. […] Alas! this is the case with respect to many other things in this world.'[29] For travellers like him, and Hedinger, there is greater authenticity and more to learn about the rocks in descending dangerous caves with miners, than following the tourist trail with its attendant absurdities.

2. Penpark Hole, Gloucestershire.

George Symes Catcott was the brother of Alexander Catcott, who had written *A Treatise on the Deluge* (1760) and had incorporated John Hutton's early writing on Yorkshire caves by way of evidence of the biblical flood. Alexander Catcott had been a student of the natural philosopher, John Hutchinson, who, in turn, had been a student of John Woodward.[30] It was George who wrote of his account of a descent of Penpark Hole in 1775. It was published in 1792 in Bristol where he worked as a librarian, lending books to Samuel Taylor Coleridge later in the decade.[31] They are all connected by published ideas on the formation and exploration of caves. Coleridge may not have been a caver though when in the Bristol area in 1798 he wrote the poem 'Kubla Khan' that used caves and subterranean rivers as a metaphor for the

[28] J. M. Hedinger, *A Short Description of Castleton in Derbyshire. Its Natural Curiosities and Mineral Productions* (Castleton: Samuel Needham, 1799).
[29] Bartholomie Faujas Saint-Fond, *Travels in England, Scotland and the Hebrides* Vol. II (London: Ridgway, 1799), p. 280.
[30] Trevor Shaw, *History of Cave Science. The Exploration and Study of Limestone caves, to 1900* (Sydney: Sydney Speleological Society, 1992), p. 124.
[31] Duncan Wu, *Wordsworth's Reading 1770 – 1799* (Cambridge: Cambridge University Press, 1993).

human imagination, a representation of caves that will be examined further in Chapter Five. Catcott provides an update on the descents of Sturmy and Collins, whose narratives and survey are included in the publication, and a sublime descent narrative of his own.

Catcott's own narrative is preceded by his mentioning of the descent of the Rev. Mr. Thomas Newnam who fell to his death down the entrance shaft of the hole. His story is told in full at the end of the book. Newnam was curious about the depth of the hole and leaned out over the shaft with his plump line, holding fast to a twig of an ash-tree. The ground upon which he stood was slippery and, with the twig breaking, away he slid into the 'dreary cavern.'[32] Catcott informs the reader that on the morning prior to the fall, Newnam had officiated at a local church and read, perhaps prophetically, the 88th Psalm, which includes the lines: 'You have put me in the lowest pit / in the darkest depths … darkness is my closest friend.' Sometime later, his body was found floating in the sump pool below and a man was paid five guineas to swim in and ferry his body back. The return of Newnam's body from the cave, provides a descent narrative that acts as a dramatic frame: the dangers of a curious mind, for Catcott's own descent narrative which presents him as one who delights in the exploration of 'the more secret and hidden Recesses of Nature' (Catcott, p. viii).

As Sulivan and MacRitchie do after him, Catcott descends with the aid of miners on two occasions. He must wear their clothing, and, in part, take on their identity. To intensify the experience, he writes that few have been bold enough to descend the cave where Newnam fell to his death. Evidently, he is and he descends the way of Newnam's fatal fall, into the darkness, silence and solitude below: 'nothing less than ocular Demonstration, can convey to the Mind an adequate Idea of the gloomy Appearance of these subterraneous Caverns' (Catcott, p. 18). The place is described through the 'darkness visible' of Milton's

[32] George Catcott, *A Descriptive Account of a Descent Made into Penpark Hole in the Year 1775* (Bristol: Rudhall, 1792), p. 33.

Paradise Lost, yet Catcott describes the cave's measurements, the orientation of chambers and passages and the types of rock he finds (Catcott, p. 19). Catcott blends the sublime aesthetic with the materiality of the environment. At one point in his exploration of this natural recess, he looks up at the rocks above and observes similar large rocks on the ground, such a fear of collapse and burial 'strike the Mind with dreadful Apprehensions of Danger' (Catcott, p. 22). He observes the process of erosion and the formation of the passage, though he does not yet find the way to describe the process, referring to it as a scene. However, he does observe that the view he has of a cavern is obstructed by the volume of water, which he is led to believe exceeds normal levels. He concludes the dimensions must be greater when water levels are closer to the mean. Catcott concludes his descent narrative with the struggle back to the surface:

> I found the Ascent far more difficult than the Descent, and was struck with Horror at the sight of the rugged Rocks I had just passed. In my Passage up, I was greatly alarmed by being thrown on my Back, in a Place where the Rock was almost perpendicular over the Water, but soon recovered myself, though not without difficulty, and was very thankful when I had once more put my Feet on Terra Firma, and had sight of my Friends and Acquaintance, who flocked round me, as if I had been a Being risen from the subterranean World. (Catcott, p. 26)

Catcott conveys the classical katabatic return of a man believed to have risen from the dead, a revenant, and ascended from the underworld. As with Lloyd, Sulivan and MacRitchie, Catcott blends the drama of the classical descent narrative with the added drama of the sublime aesthetic.

3. Dunmore Cave, Kilkenny.

Dunmore Cave had been recognized and identified as a significant cave in the early part of the century, and this later account by Adam Walker establishes it as a key location in the

understanding of limestone solution and the development of cave science. Walker is one of the most interesting figures in the development of cave and karst science and exploration; he was an engineer, scientist, teacher and explorer and was interested in applying laboratory experiments to the field. In a letter to the Royal Society's *Philosophical Transactions*, Walker describes a visit to Dunmore Cave in 1771. As I have discussed in Chapter One, Walker applies the recently attained knowledge of carbonic acid, or fixed air, as a corrosive substance when in contact with limestone. This could be the first example of this laboratory experiment into limestone dissolution being applied in the field. He writes to the secretary of the Royal Society, Charles Morton:

> I beg leave to lay before your learned Society an account of this singular cavern, as near as an eye-survey, and a few experiments on its stones and petrifactions will admit. (Walker, p. 16)

He describes crawling on all fours and having to lay a thread through the labyrinth of passages to find his way back out (Walker, p. 18). He combines the experiments and observations of a natural philosopher and the embodied descent narrative of the explorer.

Walker is articulating the shift away from the catastrophic flood event that has accounted for cave formation towards gradual geochemical process, and the shift away from static scenes of cave features to active cave processes. However, such philosophical observations take time to be understood and accepted, Charles Bowden, in a visit to Dunmore Cave in 1791, relates how the cave guides still believe in superstitious wonder and infernal Styx-like rivers. Bowden's guide tells him no one who has ever crossed the subterranean river in the cave has returned, Bowden wades in to the river but the cold and increasing depth

'suppressed his curiosity' and he returns, convincing the guide, and perhaps Bowden, of the truth of the tale.[33]

4. The Yorkshire Dales.

Dr. Richard Pococke was an excellent example of the new wave of independent travellers in the eighteenth century. He was an Oxford educated member of the clergy who travelled extensively across Britain and Europe writing journals, with two journeys to the Yorkshire Dales recorded in 1750 and 1751. Collected at the time and annotated for publication, the letters were not published until 1888. Pococke's 1751 visit to the north-west of Yorkshire starts in the district frequented by Amory's character, Buncle, with a visit to Hellgill in Mallerstang. Though not a cave, Hellgill is a deep and narrow limestone gorge; Pococke writes, 'It is curious to see the waters run at so great a depth in such a narrow channel, and to step over it.'[34] The gill is a remarkable curiosity as it cuts through an otherwise featureless, rounded hillside. It bears a striking resemblance to the narrow deep and wet gorge that Buncle and Finn pass through prior to Finn getting lost in the caves beyond, suggesting they had both experienced this unique karst landform or had read about it.

Regarding cave and karst science, Pococke's observation that the 'rivulet has worn down the rock' is an early reference, if not fully understood, to the ability of water to corrode limestone rock. He also recognises Hellgill as the rise of the River Eden and that it partially flows underground. Locals came to understand the hydrology by putting chaff in at one end and finding it to flow out at the other. This method of understanding limestone hydrology is recorded in many of the travellers to limestone country, observations that undermine the

[33] Charles Bowden, *A Tour through Ireland* (Dublin: Corbet, 1791), p. 129.
[34] Richard Pococke, *The Travels through England of Dr. Richard Pococke, Volume 1.* ed. by James Cartwright (London: Camden Society, 1888), p. 190.

concept of caves connected to the deep abyss where the biblical flood waters lie. These are caves formed at relatively shallow depths with entrances and exits clearly visible.

Pococke explored dales in Yorkshire that other later travel writers seemed to pass by. He provides the first written indication of caves that the locals saw as 'show caves' in Littondale as he travels down through Langstrothdale and Wharfedale. The first cave he visits in Littondale is un-named, near the farm at Old Coates. This is likely to be what is now known as Boreham Cave. Pococke writes:

> I went to see a grotto, which may be about twenty feet wide and two hundred yards long, a winding way and having several pools of water in it, and at last I came to deep water, which hindered me from going any farther, and I could not learn that anyone had been at the end of it. (Pococke, p. 192)

Boreham Cave fits this description, though it is not as far to the deep water as Pococke estimates. The canal he reaches continues through deep water and low airspaces to a sump which we now know leads to several kilometres of cave passage, much of it submerged. The limit of what Pococke observes on his trip would remain unknown until cave divers start to explore it in the 1950s, revealing a magnificent cave system.[35] This exploration shows the cave Pococke entered to be an abandoned resurgence, caused by a lowering of the water table, and the valley floor, and by glaciation, though Pococke would not know this, as the prevailing explanation was still that of the biblical flood.

Pococke's travels and visits to caves give us an indication of when local people were recognising the value of caves alongside the development of travel and tourism. There is evidence of regular visits to caves such as Wookey Hole and the caves of the Peak District since at least Michael Drayton's topographical poem of 1613, *Poly-Olbion* that celebrates them

[35] *Northern Sump Index 2015,* ed. by Elaine Hill and Adrian Hall (Cave Diving Group Northern Section), p. 27.

both. Pococke appears to be the first traveller to record visiting caves in Yorkshire. He visits, though does not descend, Dowkabottom Cave in Littondale, which has since been recognised as an early site of Neolithic through to Romano-British habitation. He also visits and descends the two caves that will become the staple of cave travel in Yorkshire: Weathercote Cave and Yordas Cave. It is possible he was told about one of these caves on his last trip to Ingleton in 1750. He descends into Weathercote under the arched entrance and, as most all travellers do when they visit a cave, provides the estimated measurements, assuming the reader can imagine the space through numerical coordinates. He describes the hole:

> The first fall has wore a deep hole down. From the north-east also there falls down a stream or two through the rocks, altogether making one of the most extraordinary and surprising scenes I ever beheld; this whole cavern has been sometimes full of water, and run over. (Pococke, p. 196)

Pococke's observations are again telling; as with Hellgill he observes the erosive power of water and the input of three streams. Recognising the potential for the stream waters falling into Weathercote to back-up and overflow implies that he sees the flood originating in the surface run-off and not water welling up from the abyss. He further observes that the water flowing into Weathercote also flows through Jingly Pot (Jingle Pot) and Hurley Pot (Hurtle Pot) before appearing at the surface as Chapel Beck at the resurgence at God's Brig (God's Bridge). He also observes streams flowing down from Ingleborough into Chapel Beck, many of these coming from caves in the hillside. The following day he visits Jardours Cove (Yordas Cave) in Kingsdale, again providing estimated measurements. His key observation however, is the large waterfall entering the cave; he tries to see its origin in the roof of the cave but the candles will not illuminate that far. He leaves the cave and climbs the mountain above and finds the stream entrance at Yordas Pot (Pococke, p. 196). Pococke knows what he is looking for; the cave is associated with the surface stream running off the mountain. He goes on to visit Tatham Wife

Hole on the Chapel-le-dale slopes of Ingleborough. Here he observes the rising of a spring, fossils like the ones he has found elsewhere and a range of flora unique to limestone environments. Pococke is recording a cave and karst ecology.

Though Pococke compares Jingle Pot to Eldon Hole in Derbyshire, just as he will compare Yordas to Peak Cavern, what he is observing in Yorkshire is far more interesting than what has been observed in the Peak. Bound by the reputation of the Seven Wonders, travellers have followed the conventional tour and stopped looking around them. Here Pococke is exploring equally large region as the Peak, and finding so much more to observe.

In 1769 the poet Thomas Gray visited the Yorkshire Dales and began to add to what was to become a much wider and varied tour of a limestone environment by visiting Malham Cove and Gordale Scar. He describes the natural feature through the prevailing aesthetic of the sublime and claims that its 'impression will last for life.'[36] A supplement to his tour was published in 1787, the topographic catalogue it contains was written by Gray on the blank pages of Kitchen's English Atlas and for the Yorkshire area it included the caves Dunald Mill Hole, near Burton-in-Kendal, and those of Easegill Kirk, a narrow limestone gorge above Cowan Bridge, presumably Witches Cave and Kirk Pot, and like Pococke, included Hellgill, Hardraw Falls and Kilnsey Crag.[37] The first recorded visit to Dunald Mill Hole was by Adam Walker in 1760. The visit first appeared in *The Annual Register* of that year, though reached a wider audience in the second edition of West's *Guide to the Lakes*, edited by William Cockin in 1780. This edition also included in the addenda, Gray's 'Tour' and John Hutton's 'A Tour to the Caves,' which will be the subject of Chapter Four.

As with Pococke, Walker compares Dunald Mill Hole to the much more famous caves of Derbyshire and claims it to be just as good. He cannot find any other account of the cave

[36] Thomas Gray, 'Mr. Gray's Journal' in Thomas West, *A Guide to the Lakes in Cumberland, Westmorland, and Lancashire* ed. by William Cockin (London: Richardson and Urquhart, 1780), p. 199.
[37] Thomas Gray, *A Supplement to the Tour through Great Britain* (London: Keansley, 1787), p. 23.

and sees in its obscure and secluded nature the greater curiosity. His description follows the conventions of the sublime aesthetic: 'pleasingly horrible,' 'majestic horror,' 'romantic vibrations.' He also includes references to classical descent narratives: 'the fabulous Styx,' and, after crawling on all fours and wading through the subterranean river, arrives at the entrance and 'hailed all-chearing day-light.'[38] The Derbyshire Peak District draws the attention of the cave visiting public, though these travellers are pioneers in opening the Yorkshire Dales. Thomas Dixon's poem on the River Wenning, referred to the potholes above Yordas Cave, Jingling Hole and Rowten Pot, and to the large open shafts evident on Leck Fell, above Easegill Kirk, that are now known as Lost John's Cave, Rumbling Hole, Death's Head Hole, and Gavel Pot.

The two limestone districts combine in William Bray's *Sketch of a Tour into Derbyshire and Yorkshire* in 1783. Bray describes the whereabouts of more caves drawn from Hutton's *A Tour to the Caves*, which by now had been published in an independent edition and the importance of this book will be addressed in the following chapter. He mentions Weathercote, Jingle Pot and Hurtle Pot, and, like Pococke, refers to Hurtle Pot as being full of 'black water,' probably identifying the staining of the peat from the surrounding hills. Also mentioned are Double Cave (Great Douk Cave) on Ingleborough and Yordas Cave in Kingsdale. He describes the streams that run from near the summit of Ingleborough and sink on the limestone bench below, known as The Allotment, before appearing once more in the valley floor. He calls the caves Blackside Cove, Sir William's Cove, Atkinson's Chamber and Johnson's Jacket Hole. No caves are known by these names today, though given the location Bray mentions, they are possibly the obvious large open shafts of Juniper Gulf, Long Kin East, Rift Pot or Sulber Pot; Johnson's Jacket Hole could be the Jockey Hole. All of them are very deep potholes; Bray

[38] Adam Walker, 'A Description of Dunald Mill Hole' in Thomas West, *A Guide to the Lakes in Cumberland, Westmorland, and Lancashire* ed. by William Cockin (London: Richardson and Urquhart, 1780), p. 230.

describes throwing rocks down and hearing them rumble for a considerable time, so it is a surprise to read that, 'Some of these caverns may be descended, and the passages pursued to a great distance.'[39] This is possible in Long Kin East though the other holes require long ropes or ladders to descend them. He also mentions what will become known as the deepest surface shaft in the country, deeper even than Eldon Hole, Gaper Gill (Gaping Gill), whose surface stream reappears at the village of Clapham below. Again, following Hutton, Bray accounts for Catknot Hole and Greenside Cave at Ribblehead, and Alum Pot, Hull Pot and Hunt Pot in Ribblesdale. It is not known if Bray descended any of the caves though what is important is that he is recording them as part of a recognised tour, with local guides, and that these local people understood the hydrology of the subterranean streams.

In 1792, John Byng (relative of Admiral Byng) conveys the established popularity of this tour in his visit to Weathercote Cave and his meeting with the guide, a shoe-maker, who he refers to as Jobson (the Georgian version of Muggins or Hodge – a country person). The shoe-maker lives in the house overlooking Weathercote Cave (currently a large grade 2 listed building, though it was smaller then). The cave has a high wall built around it and an arched doorway in the wall leads immediately into the large pothole at the dry end. Incorporated in the wall is long stone bench for visitors to sit while waiting for their guide. 'Jobson' puts up Byng's horses in his stable, invites him in for a drink of ale in a silver cup and after showing him round the Chapel Beck caves, described by Byng with the usual sublime aesthetic, guides Byng and his party round into Kingsdale and Yordas Cave. 'Jobson' has a shepherd to look after the horses while they view the cave and then guide the party to their inn for the night.[40] I mention this as many of the travellers write of the ever-improving tourist infrastructure of the Dales.

[39] William Bray, *Sketch of a Tour into Derbyshire and Yorkshire* (London: White, 1783), p. 302.
[40] *Byng's Tours: The Journals of the Hon. John Byng 1781 – 1792* ed. by David Souden (London: Century, 1991), pp. 163 – 164.

The clergyman, William MacRitchie's tour of 1795, like most of those after 1780, follows the route of John Hutton's *A Tour to the Caves*. He approaches via Farleton Knott ('Rock of Gibraltar') and Kirkby Lonsdale, and his tour is made up entirely of visiting caves and collecting flowers growing in limestone soils. His first appreciation of the extent and complexity of the subterranean environment appears when he arrives at the Keld Head resurgence of all the rivers and streams that sink in Kingsdale and on Ireby Fell: 'A stream of such magnitude as this springing at once from the foot of a great mountain must strike every stranger with equal surprise and astonishment.'[41] He walks up the valley to Yordas Cave, one of the subterranean sources of Keld Head, where he sees 'large torrents of water roar down through the bottom of the Cave, increasing the horrors of the scene' (MacRitchie, p. 24). It is the volume of water that strikes MacRitchie; he wades through knee deep water and observes how the water has worn the rock into grotesque forms and petrifactions (speleothems). By candle light he can observe little else in any detail. The large chamber of Yordas is so high that he cannot see the ceiling; he writes that it is 'the most magnificent dome I ever saw or probably ever will see upon the face of the earth,' yet he cannot see it. He climbs the hill above the cave entrance (Gragareth) and visits Pool Pot Hole (Bull Pot) and Gingling Cave (Jingling Pot), also sources of Keld Head. Jingling Pot is a deep vertical shaft and again the dimensions of the hole elude MacRitchie: 'the deep below has not been yet fathomed; and to look down into these pits is truly tremendous.' He throws stones down the shaft and listens to them hit the walls but cannot tell whether they reached the bottom (MacRitchie, p. 25).

MacRitchie continues to follow Hutton in his visit to Chapel-le-dale, where he calls on the curate, Mr Elishaw, to guide him. Elishaw takes them first to Hurtle Pot, which opens just behind St. Leonard's Chapel, and MacRitchie even uses Hutton's description of it as Avernian, after Virgil. Jingle Pot is too deep to measure, though someone was lowered down on a rope

[41] William MacRitchie, *Diary of a Tour through Great Britain in 1795* ed. by David MacRitchie (London: Elliot Stock, 1897), p. 24.

but still could not gain the bottom: 'the cave penetrated downwards to the north they could not say how far.' Weathercote Cave is, like Yordas, observed through the volume of water falling into it, as it is in flood conditions when they visit. MacRitchie describes Weathercote Cave as:

> The most astonishing fall of water I have yet seen; about sixty yards high; falling into a profound basin, on the side of which you go down for hundreds of feet through rude over-arching rocks, that threaten to bury you in your descent. (MacRitchie, p. 28)

Here MacRitchie witnesses the momentary surfacing of the water before it sinks again into the subterranean river system that finally appears at the God's Bridge resurgence. He is guided up the initially dry limestone valley to the source of Chapel Beck, Gatekirk Cave, and sees the whole of the river, that flows through Ingleton at the foot of the valley, pass through the cave. What he observes is the water and the deposit of dripping water, speleothems, which he breaks off for souvenirs. He climbs up Ingleborough, visits Great Douk Cave on the way and comments on the vast limestone pavements that cover much of this side of the mountain, taking care to step over the grikes, or crevices, in the pavements that are 'almost unfathomably deep,' and, after Hutton, describes the mountain as 'perforated like a honey-comb.'[42] He completes his cave tour with a visit to Catknot Hole in the banks of the River Ribble, behind the inn at Gearstones. The cave, as with Hutton, is the longest 'subterranean expedition' they have embarked upon. The water is deep and the speleothems amaze him, to such an extent he hammers them off for more souvenirs. The cave is, he writes, an 'indescribable recess' (MacRitchie, p. 34).

Henry Skrine's tour of 1797 is undertaken and published the same year MacRitchie is in Yorkshire, suggesting the increasing popularity and importance of Yorkshire as a destination

[42] John Hutton. *A Tour to the Caves, in the Environs of Ingleborough and Settle, in the West Riding of Yorkshire* (London: W. Pennington, 1781), p. 35.

for cave exploration. Given that these visits were published there must be a demand for them from many other visitors and readers. Skrine also visits Weathercote Cave, giving a similar description of the arch tottering above his head, the spectacular waterfall into the cave below that eventually breaks out to the surface of God's Bridge. Appealing to the appetite of the reader, he writes that the cave is both a 'singular curiosity' and strikingly horrid.'[43]

James Plumptre's 1797 tour to Yorkshire starts with a visit to, by now, the wildly sublime natural features of Malham Cove and Gordale Scar, and the mountain of Ingleborough. He descends this via Tatham Wife Hole, Meregill Hole, and Foxe's Hole (Sunset Hole) to Weathercote Cave, which, because of the water, he hears long before he sees.[44] It is the water that is the key thing he observes, or the lack of water in Jingle Pot and the static water in Hurtle Pot. Yordas Cave, Keld head and Thornton Force are all features of immense flows of water.

What these travellers and writers have done with their exploration is extend the range of caves that other travellers can visit. The descriptions also convey the enormous variety of cave forms. They are all unique in their size, shape and character and as such are a focus for travellers, not simply an addition to a wider tour. William Smith's geological map would identify Yorkshire as a large area of limestone, and these discoveries and the naming and locating of new caves added to the accumulation and recording of cave and karst knowledge. Here is an appetite for more caves and a district beginning to see the importance of these cave visitors through improvements to infrastructure. Though the travellers talk of taking walks in the Dales, it is the sublime descriptions of caves and the extraordinary natural history within them that dominates the accounts.

[43] Henry Skrine, *Three Successive Tours in the North of England and Great Part of Scotland* (London: Bulmer, 1795), p. 84.
[44] *James Plumptre's Britain: The Journals of a Tourist in the 1790s,* ed. by Ian Ousby (London: Hutchinson, 1992), p. 79.

5. Fingal's Cave.

Though Fingal's Cave on the Isle of Staffa, in Scotland's Inner Hebrides, is not a limestone cave, it is a cave that was measured in detail, perhaps in greater detail than any other cave in the eighteenth century. Observers also recognised the power of the sea in eroding the basalt columns in the process of forming the cave and they immediately compared it with the Giant's Causeway columnar basalt in the North of Ireland.

Thomas Pennant visited the cave in 1774 and thought it 'the most magnificent that has ever been described by travellers. […] The mind can hardly form an idea more magnificent than such a space.'[45] The rest of his account of the cave is given as tables of measurements, all made with plumb-lines and a team of workers. Pennant measures every dimension he can access.

President of the Royal Society Joseph Banks measured the cave on his way to visiting Iceland in 1772. His colleague, Uno Von Troil writes a journal of their voyage and discoveries and writes how they worked on the similarities of the volcanic lavas found at Staffa, Northern Ireland and those most recently erupted on Iceland.[46] Thomas Garnett made use of Bank's measurements when he visited the cave on his tour of 1800 He begins his account with aesthetic appreciation: 'We had a view of Fingal's Cave, one of the most magnificent sights the eye ever beheld. It appears like the inside of a cathedral of immense size, but superior to any work of art in grandeur and sublimity, and equal to any in regularity.'[47] Once the aesthetic observation is made, Garnett turns to the work of Banks and Von Troil, showing how the precision of scientific observation has been absorbed into the popular travel journal.

[45] Thomas Pennant*, A Tour in Scotland and Voyage to the Hebrides* (Chester: Monk, 1774,) p. 301.
[46] Uno Von Troil, *Letters on Iceland* (London: Robson, 1780), p. xi.
[47] Thomas Garnett, *Observations on a Tour through The Highlands and Part of the Western Isles of Scotland* (London: Cadell & Davies, 1800), p. 219.

Samuel Johnson and James Boswell attempted to visit Fingal's Cave on their tour of Scotland in 1775, but, as so often happens, rough seas prevented them from doing so. Instead, they visited a limestone cave on the nearby Isle of Mull: MacKinnon's Cave. Boswell writes that Johnson said this cave was 'the greatest natural curiosity he had ever seen.'[48] What stands out in Johnson's account is his attempt to measure the cave with his walking pole, measured against his own height, and what Johnson sees as the major problem with doing so in such great natural features. People are often overwhelmed by the sublimity and scale of what they observe; they exaggerate, they forget, they confuse one feature with another, their imagination gets the better of their reason. Johnson writes, 'More nicety however is better, and no man should travel unprovided with instruments for taking heights and distances' (Johnson, p. 133). Johnson is providing evidence of a rational and rigorous approach to observation and scale, by way of opposition to the sublime aesthetic of the immeasurable or unfathomable.

Conclusion.

An independent interest in the nature and morphology of caves is evident through these travel narratives. This increasing fascination in making subterranean journeys demands ever more varied forms of caves and passages. The writers of the narratives also continue to stress the unknown extent of cave space; for however many more caves the writers find they continue to stretch on out of sight in the darkness. The increase in the number of known caves is evidence of the expanding enormity of cave space generally. With the increase in the number of known caves, the travellers learn much more from local farmers and miners about subterranean hydrology, and through this about the interactions caves have with other natural phenomena, such as rainfall, springs and surface karst features. The popularity of

[48] Samuel Johnson & James Boswell, *A Journey to the Western Islands of Scotland & Journal of a Tour to the Hebrides* (Oxford: Oxford University Press, 1934), p. 384.

travel journals, and the framing of cave experiences by the descent narrative, provides further evidence of the place of caves in the popular imagination.

Much of intertextuality is evident in the travel writers' accounts of their underground adventures. They acknowledge each other's writing, particularly that of John Hutton in Yorkshire, and they follow each other's tour itineraries, visit the same caves and use the same guides. It is clear from the focus on individual caves and the exploration of the cave regions that cave knowledge is becoming, in Latour's words, mobile.[49] It is moving away from the local and static knowledge of farmers and miners into the publications and numerous editions of travel journals and guides.

The hybrid travel writing genre easily incorporates the discourse of natural history and philosophy; it is an essential aspect of it. The early European Grand Tour travel guides also incorporated poetry and classical literary references and this inclusion is carried over to the journals, diaries and guides of the traveller and tourist in Britain.

[49] Bruno Latour *Science in Action* (Cambridge, Massachusetts: Harvard University Press, 1987), p. 225.

Chapter Four: John Hutton and the Cave Guidebook

Introduction.

John Hutton's article, 'A Tour to the Caves', in the appendix of Thomas West's 1780 edition of *A Guide to the Lakes*, was a pivotal text in the development of cave travel and knowledge in the long eighteenth century.[1] Hutton's article would become an independent book and be the first in English to be solely devoted to caves. It was the first cave guidebook and was essential in generating the 'field' of cave and karst study in Yorkshire, the largest area of limestone in the country that now contains the greatest number of caves. It was the catalyst for an increase in the number of visitors coming to see the caves of Yorkshire, acknowledged by an extraordinary number of travel writers in the years that followed its first appearance. Hutton provided the framework and inspiration for successful guidebooks that followed, for example, John Housman's. It formed the basis of a tour of Yorkshire that is still current today with the Three Peaks of Ingleborough, Whernside and Pen-y-ghent, the three crags of Malham Cove, Gordale Scar and Kilnsey Crag, the great waterfalls of Thornton Force and Hardraw Force, the lake of Malham Tarn and the accessible caves of Kingsdale, Chapel-le-dale and Ribblesdale. It is a founding text of British cave science and exploration. As a measure of its impact and importance, it is included in this chapter as a case study of a writer who has transformed the perception of caves in the long eighteenth century, and as such will be examined in detail.

Hutton's article was written at a fortuitous moment in the development of travel and tourism in the north of England. As Thomas West's first edition of *A Guide to the Lakes* had sold so well, his publishers commissioned a second edition. West collected additional addenda, including other texts, which had some association with the Lakes to expand the

[1] Thomas West. *A Guide to the Lakes, in Cumberland, Westmorland, and Lancashire* (London: W. Pennington, 1780), p. 238.

range of the guide and the reader's experience. West's death in 1779 led to the edition being completed by his editor, William Cockin. Cockin added further addenda, footnotes and corrections to the main body of the guide for the second edition of 1780. It is this posthumous edition of West's *Guide to the Lakes* with its heterogeneous collection of poems, letters, journals and a dialect glossary that highlights the hybrid and contingent nature of the travel writing and guidebook genre. One article in the addenda, Hutton's *A Tour to the Caves in the West Riding of Yorkshire*, described as a 'Letter to a friend,' also presented something new, an article or tour based entirely on caves: the first cave guidebook (West, p. 238). Though included in West's second edition, Hutton's addendum was published independently the same year with a much-enlarged edition appearing in 1781.[2] The major part of Hutton's second independent edition made up the addenda of subsequent editions of West's guide. Like West's amalgamation of genres, Hutton too blended a wide range; he included information on distances between sites, locations and guides; he included poetry and myth, information on natural and antiquarian history, theories on cave geomorphology and a northern England dialect glossary. His miscellaneous collection was, like West's *A Guide to the Lakes*, writing in search of a genre. Hutton too identified his reader as the 'curious and speculative traveller' who longs, as much as possible, to travel independently (Hutton, p. 6).

In the eighteenth century, there was an absence of accurate maps; the most practical map for a tourist to the West Riding of Yorkshire was probably that surveyed and drawn by R.W. Seale for *The Universal Museum and Complete Magazine of Knowledge and Pleasure* in 1748-49, a volume that went through many editions in the latter part of the century.[3] It was practical in that it marked the Keighley to Kendal turnpike road and the valleys between Ingleton and Settle via the watershed of Ribblehead. There was also an absence of practical

[2]John Hutton. *A Tour to the Caves, in the Environs of Ingleborough and Settle, in the West Riding of Yorkshire* (London: W. Pennington, 1781).
[3] R. W. Searle. 'Map of the West Riding of Yorkshire' in *The Universal Museum and Complete Magazine of Knowledge and Pleasure* (London: John Hinton, 1748-49).

spatial and environmental information. Both West and Hutton were not only establishing guides, they were creating cognitive maps to these two regions, hitherto overlooked. They can be compared to the Peak District in Derbyshire and its well established 'Seven Wonders,' celebrated in the poem by Charles Cotton.[4] As a guide, West's text is constructed from material that directed and informed the reader and tourist in a detached third person account of the district; as a tour, Hutton's text is a first-person narrative of his excursion that shapes a practical route through the district and, subsequently, acts as a guide. They both generate a form of cultural history for the characteristics of the mountains of the Lake District and the caves of the Yorkshire Dales while encouraging individuals to generate personal characteristics of their own. A guidebook's purpose is to offer an individual experience of the region both through reading and practice, thus producing the writer's own personal knowledge along with the natural and cultural landscape. As Hutton is exploring a much more unfamiliar territory than West, he places the unknown and extraordinary cave environment into what is, for his classically educated reader, the familiar underworld of Virgil and Ovid, along with the contemporary aesthetic of the sublime. By the end of the *Tour*, this subjective narrative gives way to a more objective scientific theory concerning the formation of caves. Here his contemporary, Standard English is joined by the 'glossary of old and original words now used in the North of England.' Even by the standards of the hybrid genre of travel writing in the eighteenth century, Hutton's *Tour* is a remarkably inchoate amalgam of styles and genres. This stylistic and generic instability has its origins in the philosophical and aesthetic debates of the time, the rise in the popularity of travel, especially into isolated mountain districts, class and gender identities and the unchartered and unexplored nature of the caves.

Though both the *Guide* and the *Tour* were published independently, they also appeared together for eleven editions between 1780 and 1821. They both sought out a similar

[4] Charles Cotton. *The Wonders of the Peak* (Nottingham: Thomas Collyer, 1744).

reader though Hutton was at pains to establish a degree of difference between his tour and that of West's. He begins his tour of Yorkshire after completing his tour of the Lakes, and owns that the Yorkshire cave tour pleased him the most. The natural history of the caves was more to his liking and they were finer examples of 'the extraordinary and the terrible,' 'the profound and the sublime' (Hutton, p. 5). He claims he has nothing to add to the well-trodden paths and tours of the Lakes as they provided 'no adventures that were peculiarly amusing.' Hutton demands more of the reader who follows him underground; it is here that truly curious will search the 'hidden recesses of nature' for amusement, or surprising digressions. West's guide rarely takes the traveller to the tops of mountains, only to viewing stations where you could see them. His guide took you to stations to see and gaze at the environment, to admire it from a framed distance. Hutton's tour takes the traveller up the mountain and under it, and such travel requires an embodied engagement, a degree of assimilation into the environment. In redefining the curious and speculative traveller, Hutton defines a type of masculinity as one in pursuit of the authentic scientific and aesthetic experience, one willing to go to extremes. In his own descents, Hutton summons up the heroic spirit of Aeneas as he descends into the underworld and goes beyond the normal limits and boundaries of eighteenth-century experience. Hutton believes his liminal journey gives him access to knowledge concealed in the dark, deep recesses of the mountains, whereas to some of his contemporaries he is simply relying on a classical stereotype, a comic hyperbole, and confusing the underworld with the underground.

Hutton states in his introduction that he was urged to write up his tour of the Yorkshire caves by West and Cockin, that it was commissioned specially to expand the range of *The Guide to the Lakes*. However, there is evidence that Hutton had written about the Yorkshire caves long before this commission and it is evident that he reworked the guide through two independent editions and through the various editions of West's Guide up to the ninth of 1807. He died in 1806. Hutton's *Tour to the Caves*, through its relationship with West's

Guide to the Lakes, epitomises the efforts to create a genre and an identity out of exploration and travel, and science and aesthetics in the latter half of the eighteenth century.

Guidebooks before *A Tour to the Caves.*

Hutton's *A Tour to the Caves* was unique in its singular observance of caves, though in all other aspects it drew on a tradition of travel journal and guidebook writing from the turn of the century. It absorbed the hybrid genre through first person narrative, its daily tour structure, an instructive itinerary, the form of a letter, the framing of sublime and picturesque scenes, the use of classical landscape poetry as part of this framing, a tentative proposal of scientific ideas, a range of antiquarian as well as natural history observations, and a sense of an adventure into danger and the unknown. In all ways, the book was a product of its time, as Carl Thompson argues:

> This was a period in which travel books were read both for intellectual profit and for literary pleasure. Many were at the cutting-edge of contemporary scientific, political and moral debate; others again were in the vanguard of some of the period's most important aesthetic developments.[5]

However, the exception for Hutton was that he made conspicuous a space that had been seen only incidentally, and occasionally; it brought the subterranean environment into a field of view, a landform worthy of interest and study, rather than as an adjunct to a wider landscape. Descent narratives had traditionally been an episode in a much longer journey, for Hutton they were the purpose of the journey.

Hutton's style and structure is evident in the writing of Joseph Addison, who in his guide for the wealthy young men on the Grand Tour, *Remarks on Several Parts of Italy* (1705), placed the Latin original and a translation of classical 'place' poems alongside descriptions of

[5] Carl Thompson, *Travel Writing* (London: Routledge, 2011), p. 45.

famed landscape scenes. His classically educated readership would be expected to recognise the reference from the dominant literary genre:

> I must confess it was not one of the least Entertainments that I met with in travelling, to examine these several Descriptions, as it were on the Spot, and to compare the Natural Face of the Country with the Landskips that the Poets have given us of it. However, to avoid Confusion that might arrive from a Multitude of Quotations, I have only cited such Verses as have given some Image of the Place, or that has something else besides the bare Name of it to recommend them.[6]

Addison visits the Bay of Naples and provides a poem by Silius Italicus that describes the Sibyl's Cave and the entry to the underworld. Hutton provides similar cave related extracts from Virgil and Ovid throughout his *Tour*.

In 1730, an English translation of a German guidebook was published, *The Natural History of the Hartz-Forest,* by Georg Henning Behrens.[7] Though not entirely concerned with caves, they do make up a large part of the book. Behrens writes about the caves of the Hartz Mountains and then shows how the other features he describes, the springs, sinks, dolines, pools, rivers and other mountain landforms, are associated with the caves. He associates speleothems with the passage of rainwater through the roof of the cave, suggests how mud washed in to the cave blocks subterranean stream ways and diverts their course and how caverns collapse and leave dolines on the surface that fill with water. Behrens is aware of a dynamic and changing environment, though he never states it as such directly. He writes that the cave visitor must hire a guide and dress as a miner would do, taking on his identity, as Catcott, Sulivan and MacRitchie will later do, and be prepared to climb, crawl, squeeze and

[6] Joseph Addison, *Remarks on Several Parts of Italy, etc. in the Years 1701, 1702, 1703* (London: Jacob Tonson, 1705), Preface.
[7] Georg Henning Behrens, *The Natural History of the Hartz-Forest, in his Majesty King George's German Dominions* (London: Osborne, 1730).

slide his or her way through difficult terrain. It is a third person account of the natural history of the mountains and so comparable with those written by Ray, Hutchinson and Woodward, though Behrens does not adhere to any theory.

Many travel publications used the noun 'tour' in their titles, others used 'observations,' 'descriptions,' 'excursion' or 'journal.' The etymology of the word 'tour' is from Old French, the 'turning of a circle' or a 'revolution' and its use as a description of a return journey first appeared in English in the mid-seventeenth century. For Hutton, it is an apt title, given the katabatic nature of his subterranean journeys. Prior to Hutton's *Tour*, perhaps the most widely-read 'tour,' one that went through eight editions in the writer's lifetime and one that ventured into an unknown part of Europe, into sublime danger and therefore something of a model for Hutton, was Patrick Brydone's *A Tour through Sicily and Malta* (1773). Brydone used the sublime in a fitting context: the crater of an active volcano, Mount Etna. After climbing the volcano, standing on the brink of the crater and looking in, he writes:

> 'The senses, unaccustomed to the sublimity of such a scene, are bewildered and confounded; and it is not till after some time, that they are capable of separating and judging of the objects that compose it. […] But this is by much too vast for our senses, not intended to grasp so boundless a scene'[8]

Brydone understands why the locals believe the crater is the entrance to hell though he is more interested in the processes that force an eruption, about the generation of power that will propel lava out of the mountain, through the crater and then to overflow the brim: 'The meditations are ever elevated in proportion to the grandeur and sublimity of the objects that surround us; and here, where you have all Nature to arouse your admiration, what mind can

[8] Patrick Brydone, *A Tour through Sicily and Malta* (London: 1792), p. 205.

remain inactive?' (Brydone, p. 216). He may be observing a scene but it is for him a dynamic one; he is conscious of geomorphological processes altering what he sees.

The idea of the static scene, the picturesque view, was championed by William Gilpin, who had written one of his guides to the Lake District, which also incorporated a trip to the caves of the Peak District in 1772. Like Addison, Gilpin quotes Virgil and Ovid at critical points, at the entrance to Peak Cavern, for example; he likens himself to Aeneas when he first sees the Sibyl and the entrance to Hades.[9] Where Hutton and Gilpin differ, however, is Gilpin's disinterest in caves; he is glad to get out of Peak Cavern and concludes that there is nothing picturesque in a cave. West probably drew more from Gilpin such as his use of stations, the places to view a picturesque scene.

The Contemporary Context of *A Tour to the Caves.*

Hutton was not the first to describe visits to the caves of Yorkshire; Dr. Richard Pococke had visited the Chapel-le-dale caves and Yordas Cave in 1751. Pococke had also visited caves in Upper Wharfedale and Littondale. Thomas Gray had passed through Yorkshire on his way home from the Lake District in 1769; though his journal does not describe any visits to caves, he does visit Malham and Gordale. As with Pococke's visit, this suggests there was already some attempt to attract travellers to Yorkshire. In 1761, *The Gentleman's Magazine* and *The Annual Register* both included an article, written by 'Pastor,' entitled 'Natural Curiosities of Ingleborough, a Mountain in Yorkshire.'[10] This has since been attributed to Hutton, who was born and raised in the nearby village of Burton-in-Kendal, though was studying at Cambridge University at the time.[11] This article locates many potholes on the mountain of Ingleborough,

[9] William Gilpin, *Observations on Several Parts of England particularly the Mountains and Lakes of Cumberland and Westmoreland relative chiefly to Picturesque Beauty* 2 vols (London: Cadell & Davies, 1808), II, p. 210.
[10] John Hutton (pseud. 'Pastor'), 'A description of Ingleborough, a mountain in Yorkshire' in *Annual Register* 1761, pp. 100-101.
[11] Trevor Shaw, 'John Hutton, 1740? – 1806. His "Tour to the Caves" and his Place in the History of Speleology' in *Studies in Speleology Vol. 2, Parts 3-4, 1970-71,* pp. 109 – 128.

all are vertical shafts falling from the surface, none of which appears to have been descended. It includes early theories of cave hydrology, largely garnered from local farmers, concerning where streams sink on the mountain and rise in the Lune and Ribble rivers.

West's first edition of *The Guide to the Lakes* concludes with a suggestion to visit the cave, Dunald-mill-hole, near Hutton and Cockin's birthplace, Burton-in-Kendal. The Addenda in the second edition includes two letters from Adam Walker. He describes Dunald-mill-hole in more detail as Article V in the Addenda and his description of Weathercote Cave is Article VI. Hutton's 'A Tour to the Caves' is Article VII. The 1761 article on the caves of Ingleborough is referred to after Walker's Article VI. This article maintains his pseudonym, 'Pastor,' and Hutton's 'Tour' is attributed to 'JH' which continues, even with the independent editions, until after his death in 1806 where the 1807 edition refers to him as 'the late Rev. John Hutton B.D. Vicar of Burton.' This accounts for the anonymity of the 'Tour' in the references that followed it.

The impact of Hutton's *Tour* on following travellers and writers was considerable. His work started to appear in the published writings of travellers as Yorkshire's accessibility via the Keighley to Kendal turnpike (1753), and presumably Hutton's *Tour*, brought more of them to visit. William Bray, in the 1783 edition of his *A Journal of a Tour in Yorkshire*, writes that he is guided by 'a pamphlet, called *A Tour to the Caves*' (Bray, p. 300). The 'pamphlet' suggests he has one of the independent editions. He also refers to the 1761 article in *The Gentleman's Magazine* in describing the caves missed out of the independent editions. Thomas Hurtley's book on the *Natural Curiosities of Malham* (1786) includes a sizable quotation from *A Tour to the Caves* addressing Gordale Scar, he refers to the author as 'a late Writer' (presumably Thomas West who died in 1779).[12] When describing Malham Cove, he quotes from *A Tour to*

[12] Thomas Hurtley, *A Concise Account of Some Natural Curiosities, in the Environs of Malham, in Craven, Yorkshire* (London: 1786), p. 61.

the Caves concerning the 'great spirit and agility' required to traverse the rim of the cove. He adds that at the foot of the cove lies a shelf that can be traversed and upon it lies a 'Register' in which those who cross sign their names to mark their 'Pilgrimage to the *Genius of the Caves*' (Hurtley, p. 39) ('Genius' here referring to 'spirit of a place.'). He continues to write that he has 'avoided following the example of Mr. West and other writers upon similar subjects,' by describing natural curiosities in too much detail (Hurtley, p. 67). James Plumptre in his 1793 tour through Yorkshire follows Hutton's *Tour* though only refers to it in passing by commenting on Catcott's *Treatise on the Deluge* (1761) which includes Hutton's article on the caves of Ingleborough. Plumptre was also a contributor to West's *Guide*, his poem, 'A Night Piece on the Banks of Windermere,' was Article V in the Addenda of the third edition. William MacRitchie does not refer to Hutton's *Tour* in his 1795 journal of his tour of the Yorkshire caves though he does follow all of Hutton's tour and has the curate of the Chapel-le-dale church, Mr Elishaw, as his guide. Hutton himself refers to his 'reverend guide' when in Chapel-le-dale. In his 1800 guide to the Lake District and Yorkshire caves, John Housman mistakenly writes that *A Tour to the Caves* was written by the curate of the Chapel-le-dale church. Almost the entire section of this guide devoted to the Yorkshire caves is either taken directly from Hutton or is in the form of a paraphrase.[13] On his tour through Yorkshire in 1796, John Byng writes that he has journeyed to Yorkshire simply because of *A Tour to the Caves* and Hurtley's book on Malham.[14]

The impact of Hutton's writing, and its importance in the development of cave science and culture, is further evident in the guidebook writing of William Wordsworth. Wordsworth was familiar with Hutton as he had a copy of West's *Guide* in his library. His own *Guide to the*

[13] John Housman, *A Descriptive Tour, and a Guide to the Lakes, Caves, Mountains, and other Natural Curiosities, in Cumberland, Westmorland, Lancashire, and Part of the West Riding of Yorkshire* (London: 1800).
[14] *Byng's Tours: The Journal of the Hon. John Byng 1781 – 1792* ed. by David Souden (London: Century, 1991), p. 168.

Lakes, first published anonymously as an introduction to Joseph Wilkinson's paintings in 1810, begins with a reference to West's *Guide*, and subsequent editions made further references to it. The first independent edition of Wordsworth's *Guide* was published in 1822, the year after the final edition of West's *Guide*.[15] The complete final text edition followed in 1835 and the *Guide* had become considerably more practical as the district opened with improved transport and accommodation.[16] By 1842, Wordsworth's *A Complete Guide to the Lakes* expanded further and followed Hutton's example by having an appendix devoted to the geology of the district. Wordsworth's *Guide* included three letters from the Cambridge University professor of geology, Adam Sedgwick, a contemporary and correspondent of Wordsworth's, born in the village of Dent, Cumbria. Along with that of the Lakes, Sedgwick also describes the limestone geology of the Yorkshire Dales and the caves found there.[17]

Hutton's *Tour* will have shaped Wordsworth's own explorations of Yorkshire and his visits to the caves. In Book VIII of *The Prelude* (VIII, 711 - 741), Wordsworth describes a visit to Yordas Cave in Kingsdale, this being one of the key destinations on Hutton's *Tour*. In Book VI (VI, 208 – 210), he describes the summer of 1787 where he and his sister Dorothy 'roved the distant nooks' of the Yorkshire Dales, West and Hutton's guides were in their third edition then.[18] Wordsworth's three sonnets of 1819 on Weathercote Cave, Malham Cove and Gordale Scar are, as their title states 'Suggested by Mr W. Westall's Views of the Caves in Yorkshire,'[19] inspired by William Westall's volume of drawings of the caves of Yorkshire, not necessarily by Hutton's description of all three of them, though like Yordas Cave they are key destinations on his tour.[20] However, an anonymous reviewer of Wordsworth's sonnets in *Blackwood's*

[15] William Wordsworth, *A Description of the Lakes* (Otley: Woodstock Facsimile, 2002).
[16] William Wordsworth, *Guide to the Lakes* (London: Frances Lincoln, 2004).
[17] William Wordsworth, *A Complete Guide to the Lakes* (London: Longman and Co. 1842).
[18] William Wordsworth, *The Prelude. The 1805 Text* ed. by Ernest de Selincourt (Oxford: Oxford University Press, 1970).
[19] *The Poetical Works of William Wordsworth* ed. by Thomas Hutchinson (Oxford: Oxford University Press, 1923), pp. 268 – 269.
[20] William Westall, *Views of the Caves near Ingleton, Gordale Scar, and Malham Cove in Yorkshire* (London: John Murray, 1818).

Edinburgh Magazine in 1819, directs the reader to West's *Guide* and then in particular to Hutton as the man who drew people to the caves of Yorkshire by way of his *Tour*, especially William Westall.[21]

However, not everyone read Hutton's *Tour*. John Scales wrote to the editor of *The Monthly Magazine* in 1812 stating that 'the number of persons who visit the caves is very small, compared with the throng of rank and fashion who every season stop at the Castle in Castleton.'[22] The Derbyshire Peak District caves were much more famous among the growing numbers of tourists than those of Yorkshire; Castleton has two of the 'Seven Wonders of the Peak District' in Peak Cavern and Eldon Hole, and a third, Poole Cavern, is very close by. In urging readers to visit the wonders of Yorkshire, Scales follows Hutton's tour to Yordas, Weathercote, Malham and Gordale, though does not mention him. He does, however, give detailed directions in finding the locations, something Hutton does only sparingly.

Establishing the Field of Cave Geomorphology.

Though caves were largely identified as existing in limestone rock, the areas of study in the early eighteenth century were limited to isolated areas and a narrow group of easily accessible caves, open to tourists: Wookey Hole in Somerset, Dunmore Cave in Kilkenny and the three caves of the Peak District. The access to and study of caves in the Castleton area of the Peak expanded later in the century, with miners exploring the natural caverns they had mined into in the Speedwell, Odin and Blue John mines. However, the most extensive discoveries were those made in Yorkshire with caves being recorded by Pococke in 1752, 'Pastor' (Hutton) in 1761, and Gray in 1769, before Hutton's *A Tour to the Caves* in 1780. As travel and accommodation improved in Yorkshire it started to become the place to study limestone caves

[21] Anon. 'Three Original Sonnets of Wordsworth: Suggested by Westall's Views of the Caves in Yorkshire' in *Blackwood's Edinburgh Magazine Vol. IV 1818-1819,* p. 471.
[22] John Scales, 'Description of Caverns in Yorkshire' in *The Monthly Magazine Vol. 34 1813,* pp. 489 – 492.

and karst environments. Hutton's *Tour* and, later, Housman's *Descriptive Tour* and *Topographical Description*, established the 'field' of cave and karst study, aided by the proximity of the Lake District and the study of its geology, along with its immense popularity as a tourist destination. The convenience of visiting Yorkshire as well as the Lake District was expressed by Hutton and West, Housman and eventually Wordsworth and Sedgewick. As Golinski argues in relation to the work of Black and James Hutton in Edinburgh, scientific discoveries and the observation of natural phenomena are produced or discovered in distinctive local settings.[23] This is certainly true with the work of John Hutton and the caves of the West Riding of Yorkshire.

Though knowledge of the geology of the north of England has changed with developments in geophysical and geochemical technology since the late eighteenth century, the actual landforms have not changed in any considerable way. Travellers and geologists then observed the landforms observed in the present. The difference lies in what is understood by the observer. West, Cockin, Hutton, Housman, Murray and Wordsworth recognised the proximity and contiguity of the topography of the West Riding of Yorkshire and the Lake District. The Pennine Hills are connected to the Lake District Hills, the carboniferous limestone that dominates the landscape of the Yorkshire Dales surrounds the Lake District massif at a low altitude, creating what is now known as the Cumbrian Ring. The rivers in their mountains and valleys share catchment areas. The mountains rise to a similar altitude and share the same climate. However, the two areas are also distinct in their topography. The Yorkshire Dales is largely formed from sedimentary rocks which have eroded into rounded hills and wide valleys, whereas the Lake District is largely formed by igneous rocks which have eroded into crags and peaks and narrower valleys. Both areas are contiguous though they do have distinct boundaries. The Dales is bordered by the Shap Pass and the Dent Fault to the west, the

[23] Jan Golinski, Science as public Culture: Chemistry and Enlightenment in Britain, 1760 – 1820 (Cambridge: Cambridge University Press, 1992), p. 2.

Stainmore Pass (Stainmore Summit Fault) to the north, the Nidderdale valley to the east and the Craven Faults to the south. The sedimentary rocks, and especially the limestones, were deposited in a shallow sea on a raised 'horst' block, surrounded by deep water basins, now known as the Askrigg Block. Eighteenth-century travellers noted the limestone pavements, terraces, scars, dry valleys and gorges, stream sinks and risings, caves and potholes that are all distinct landforms of a limestone environment. They may not have known the geological detail that is currently available though they knew clearly enough the nature and boundaries of this 'field.'

The existence of the 'field' is central to the study of cave science. Though perhaps the key advance in understanding cave morphology was being made in the chemist's laboratory, the wider understanding of natural processes had to be discovered in the field. The geographers, Rob Inkpen and Graham Wilson, argue: 'Phenomena exist in a raw state in the field, interacting and producing expressions of their existence, and it is up to our ingenuity as field scientists to uncover, or if you prefer, discover.'[24] They argue that this discovery can be a creative act as these 'expressions of existence' are induced and drawn from the field through careful, prolonged and repetitive observations. As Lorraine Daston and Peter Galison argue,

> A single observation could not reveal a truth. Nature was too variable; individual observations were always qualified by particular circumstances. Hence the importance of routinely replicating observations in eighteenth-century natural history: rarely an expression of distrust or scepticism, this practice was more often justified as necessary to stabilize the phenomenon and to extract the essential from the accidental.[25]

[24] Rob Inkpen and Graham Wilson, *Science, Philosophy and Physical Geography* (London: Routledge, 2013), p.119.
[25] Lorraine Daston and Peter Galison *Objectivity* (New York: Zone Books, 2007), p. 234.

The identification of the phenomena and the subsequent routine observations are bound up with the initial identification of the field. In the case of cave and karst science, the observer requires exposed, observable and contiguous phenomena on a scale that will provide range and depth of study.

Hutton states in his introduction that he is producing something new, that he is providing the first guide to caves and a first guide to the West Riding of Yorkshire (Hutton, p. 5). He also provides a guide, in the independent edition, with geomorphological speculations along with aesthetic appreciation. He may not be aware of it but he is also laying the foundations for this area to be a key 'field' in cave and karst science. Curiosity is still one of the key motivating forces that drive Hutton in search of caves and their deep interiors. In his introduction, he writes:

> Our amusements were mostly in the extremes, either on the tops of high mountains, or below the surface of the earth, in caverns and subterranean paths, seldom visited by the curious and speculative traveller. (Hutton, p. 6)

Hutton's cave traveller is not only curious, they must also be speculative. As Daston and Galison point out, 'a single observation does not reveal a truth.' Much of what Hutton observes is concealed and can only be seen by those who are willing to test themselves and pry into the 'hidden recesses of nature' or who can extract from visible surface features or processes what is happening underground and out of sight. The adverb 'seldom' suggests that, though increasing in popularity, descents of caves are not yet comparable to walks in the mountains. Hutton's *Tour* appears to be written for the singular, exceptional traveller, someone distant from the common tourist.

Hutton claims at the close of his tour that his speculations conform to the events related by Moses and his reasoning is agreeable to the principles of Sir Isaac Newton (Hutton, p. 83). He adheres to the theory of the biblical flood, the Catastrophists' theory; yet his

speculations include the gradual erosional process of water on limestone. Hutton observes the cave and karst phenomena of the Dales with the prior knowledge of Moses and Newton. When he enters Yordas Cave, he claims it is his first descent into a cave, yet it is now assumed that the author of the article on the caves of Ingleborough in 1761, was Hutton. He was born in nearby Burton-in-Kendal, and attended Sedburgh School, located in the Dales and bordering on Buncle's Stainmore. In the introduction, he writes that the cave-ridden Dales are familiar to him from his infancy and youth. His fellow travellers are likely to have been Thomas Pearson, collector of books and owner of one of the finest private libraries in the country, and William Cockin, local teacher, poet and editor, who probably commissioned the Tour as an addendum to West's *Guide*; both men were also his contemporaries from Burton-in-Kendal.

The questions raised from Hutton's *Tour* and the establishing of the 'field' for cave and karst science was what phenomena did he observe and how did he understand them? Though not acquainted with plate tectonics, nor the geological vocabulary, Hutton immediately recognises the dominant topography of the area, the influence of the Askrigg Block and major faulting along its boundaries. On the Kendal turnpike road at Kirkby Lonsdale he distinguishes the sudden rise of the mountains to the north and the sweep of lowlands to the south, the low-lying land of the Craven basin, largely separated from the hills by the Craven Faults. He also identifies the boundary formed by the River Lune to the north and west, also formed by the Craven Fault. He describes the long views to the south as he rides along the road which contours the foot of the mountains (Hutton, p. 10). These boundaries are further marked by the south flowing rivers of the Lune, the Ribble and the Wharf that rise on very distinctive looking mountains, particularly the three large ones now known as the Three Peaks. These hills he describes as being for the large part limestone and capped with 'sandy gritty stone' (sandstone); the boundary between these rocks is distinct as the limestone forms long, deep benches or terraces, divided by long scars; the terraces are often bare of soils and limestone pavements are evident. It is from the higher-level sandstone that the streams

appear on the surface and then sink when they reach the limestone, and then reappear in the valley floor and feed the rivers (Hutton, p. 32). Along with the sinks and resurgences, he describes the large dolines, or shakeholes, that also feature on these limestone benches. Hutton may not have been familiar with the geochemical process of limestone dissolution but he is clearly observant enough to recognise the effects by identifying all these typical landforms.

The key landform is, of course, the cave. Hutton visits horizontal caves (Yordas, Gatekirk, Great Douk, Catknot and Long Churn), and vertical caves, or potholes, (Hurtle, Jingle, Weathercote, Meregill, Hardrawkin, Alum, Hull and Hunt pots), recognising that some are both horizontal and vertical (Yordas, Weathercote and Long Churn and Dicken). He measures the caves where he can and, not surprisingly, discovers they come in all sizes. Some are dry, some have streams running through them and others are filled with water; some are wide open, others are filled, or partially blocked, by fallen rocks and washed-in gravel and mud. Speleothems abound on the ceilings and on the floors. He identifies allogenic streams running off the sandstone slopes and onto the limestone to sink in potholes and to resurface in the valleys below. Here again, Hutton identifies the cave forms, the inception horizons, erosive and corrosive processes and the relationship of the cave to its wider context. As with Burnet before him, Hutton imagines the extent of the unknown cave passages that must exist in the limestone; Ingleborough, he writes, 'must be perforated and excavated in all directions like a honeycomb' (Hutton, p. 35). These are features and processes that do not occur in the adjacent Lake District, Hutton places them in the field of Yorkshire cave and karst.

Hutton, though guided by Moses, observes the caves in detail and identifies many of the phenomena a current cave scientist would observe; however, perhaps the most interesting point that emerges from his tour is what no one can see, the phreatic subterranean hydrology. His descriptions of Kingsdale, Chapel-le-dale, Ribblesdale and Malham are drawn

from the local farmers' water-tracing technique of dropping some form of grain into the sink, or washing mudded sheep, and monitoring the water's emergence lower down the valley. Such a process is a necessary part of their agriculture, as they rely on constant water sources.

Due to the huge glacial moraine at the entrance to Kingsdale, the only way into the valley then was via the river-cut gorge of Swilla Glen and the spectacular waterfall of Thornton Force or by the Roman Road out of Ingleton and over the foot of Scales Moor. The moraine creates a great ridge that effectively seals this classic example of a glaciated valley but for the steep and narrow glen, 'There was no descent from this vale, except the deep chasm where we saw the cascade' (Hutton, p. 13). Hutton describes its unique topography as 'the most extraordinary of any I had yet seen' and the valley and the shepherd's house at Braida Garth as 'secluded from the world' (Hutton, p. 14). Glaciers were, of course, familiar features for those who had travelled to the Alps but the notion of paleoclimate change and glacial cycles affecting Britain and northern Europe was yet unknown. Hutton is not simply walking into a valley; he is comparing the valley with the many others he has visited and is identifying the unique topographical features. This is an example of Hutton and his companions returning to detailed observations of recurring landforms and moving beyond simple curiosity. Once in the valley he discovers the resurgence at Keld Head and comments how all the streams that sink in the valley's limestone, such as the one he observes in Yordas Cave further up the valley, reappear at this impressive rising. The river bed above Keld Head is dry most of the year, 'there is a broken, serpentine, irregular channel, extending to the top of the vale, down which a large stream is poured from the mountains in rainy weather' (Hutton, p. 13). This channel has now been straightened-out into a regular river bed, though it still only flows when the subterranean passages below are full. The trace of the old filled-in meanders can be seen in the fields of the valley floor. Hutton observes the cave, and the untrodden path 'that extends itself into the heart of the mountain,' the dry river bed above and the resurgence and, though attributing the landforms to the work of the biblical flood, his Newtonian reasoning and

Virgilian imagination are drawing him into complexities that surpass the vague generalisations of Genesis.

Such complexities are repeatedly observed and the finest example of subterranean hydrology lies in the Weathercote Cave system in the adjoining valley of Chapel-le-dale. As with Kingsdale, Hutton refers to the distinct scars and bench features of the valley as 'very striking to the naturalists,' and his first stop is at the God's Bridge resurgence just below the tiny village and St Leonard's Church and the dry valley running on up behind it. Hutton writes:

> [The river] gushes out of several fountains at once, all within twenty or thirty yards of each other, having run about two miles underground, though making its appearance in two or three places within that distance. When there are floods, it runs also above ground, though not in all places, except the rains are extraordinary great. (Hutton, p. 21)

Hutton is not the first to visit and observe this subterranean phenomenon. Richard Pococke had observed the hydrology in 1751, and Adam Walker had also visited in 1779. Hutton refers to Oliver Goldsmith's *An History of the Earth, and Animated Nature*, first published in 1774, that refers to the subterranean River Greta as the finest example in this country of such a system.[26] Hutton visits Hurtle Pot, behind the church, the deep shaft that drops to a sump pool, and Jingle Pot, further upstream, that is also a shaft dropping into a pool. Both pools are exposures of the subterranean river. Further upstream again is Weathercote Cave, a third shaft eventually exposing the subterranean river. Hutton writes of it: 'The water sinks as it falls amongst the rocks and pebbles at the bottom, running by a subterranean passage about a mile, where it appears again by the side of the turnpike road, visiting in its way the other caverns of Ginglepot and Hurtlepot' (Hutton, p. 26). Hutton describes the overflowing of the system during heavy and continuous rain, how the 'subterranean crannies and passages' fill

[26] Oliver Goldsmith, *A History of the Earth, and Animated Nature* (London: J. Nourse, 1779), p. 224.

and the water is forced to run along the surface. Further again upstream, Hutton visits Gatekirk Cave, the cave from where the stream, Winterscales Beck, has one of its origins. It runs some distance down the valley to sink at Haws Gill Wheel, a large rock filled doline, before emerging as the spectacular waterfall at Weathercote. The other source of the beck is the allogenic stream, Force Gill, that rises high on the gritstone and Yoredale Limestones of Whernside from the remote location of Greenside (Greensett) Cave. Hutton observes a large cave entrance (which has since collapsed) in the Main Limestone of the Yoredale Series, different in horizontal structures to the caves in the Great Scar Limestone he has observed below. Here he sees thinly bedded cyclothems, identifying a stratum of coal several inches thick. The stream runs out of the cave and descends underground briefly and then appears again as it flows along the surface of the impermeable sandstone beds, all of which lie on top of the main thickly bedded Great Scar Limestone that contains all the other caves he visits (Hutton, p. 38). Winterscales Beck is superficially the main feeder of the Weathercote System, other allogenic streams that become subterranean stream passages also contribute to it. Hutton climbs up the mountain of Ingleborough that overlooks the valley and visits Great Douk Cave, Hardrawkin Pot and Meregill Hole and describes the allogenic streams running off the sandstone, sinking into the limestone in these potholes and then re-emerging down in the valley at the God's Bridge resurgence. It is a remarkable hydrological trace centred around the cave of Weathercote. The stone bench built as part of the wall surrounding Weathercote Cave is where visitors waited for the guide to take them through the gate and into the cave, which Hutton calls it 'the most surprising natural curiosity of the kind in the island of Great Britain' (Hutton, p. 25). It is here that Hutton, like Burnet, imagines the 'honeycomb' of caves lying unseen beneath his feet, a subterranean labyrinth in the valley floor and rising up and through the mountains of Ingleborough and Whernside that rise on either side of him.

The 'speculative curiosity' of Hutton lights upon two more subterranean hydrological systems that share a distinct feature. The stream sinks at Hull Pot and Hunt Pot on the

mountain of Pen-y-ghent and resurfaces at the risings of Douk Gill Cave and Brants Gill Cave respectively. The cave passages must cross each other. Most of the water sinking on Pen-y-ghent rises at Brants Gill though in major flood conditions it also resurges at Douk Gill; this suggests there is open passage in the system that can fill and overflow into another passage. The farmers discovered this by washing sheep and monitoring where the muddy water came to the surface. Similarly, at Malham, farmers discovered that the water sinking below Malham Tarn did not rise, as initially and intuitively thought, at the rising below the nearby Malham Cove but at the rising below the village at Aire Head. Water sinking to the west of Malham Tarn was discovered to resurface at the Cove. However, under severe flood conditions the waters mix. This had been reported to the Royal Society by John Fuller, and published in *Philosophical Transactions* in 1739.[27]

These four examples show how the farmers and natural philosophers of the eighteenth century were beginning to observe and understand cave systems that they could not access or see by way of the surface processes. Their discoveries refute the theories that these caves are connected to the deep abyss that stored the water for the biblical flood, or to the sea. Hutton confirms this in the philosophical speculation section of his book, where he describes how the mountains cause the clouds coming in from over the Irish sea to rise and release their water vapour as rain. He recognises that all the cave streams originate on the surface and that 'the springs were entirely dependent on the rains' (Hutton, p. 72). Hutton is close to understanding the effect of the rain on the limestone though only up to a point. He knows of Joseph Black's discovery of 'fixed air' (carbonic acid) in rain and stream water and he is aware of the process of corrosion though he believes it only to work on softer types of limestone; as for the 'harder type', 'there is no possibility of their being worn by all the rain

[27] John Fuller, 'A Description of a Large Lake Called Malholm Tarn, Near Skipton in Craven, in the County of Yorkshire' in *Philosophical Transactions* 1739-1741, 41, pp. 612 – 614. <rstl.royalsocietypublishing.org/content/41/459/612.full.pdf+html> [accessed on 21 June 2018]

since the creation, if the rocks were still in their present hard and durable state.' The initial rocks were dried out and hardened by the sun though those concealed from it remained moist and streams pouring into fissures in the strata 'would soon wash itself a wider passage amongst matter that had so little tenacity' (Hutton, p. 58). Hutton claims he does not know how this process works; it should be left to the chemists to explain. Hutton, however, does make the claim for corrosion though in believing in biblical chronology, his natural processes do not have enough time. Here is a fine example of a thinker and field-observer guided by both Moses and Newton.

Hutton is clearly at pains to stress his tour was not motivated by the simple curiosity typical of a tourist:

> The amusement from travelling is very languid and transitory, when it is pursued only for pleasing the eye: Recreation of this sort will produce a more sincere and lasting pleasure, if we are at the same time able to improve the understanding, to benefit society, and display the wisdom and goodness of the creator, by an investigation into the operations of his providence. (Hutton, p. 83)

He argues that he cannot show such confidence in a subject where so much of the data is concealed or uncertain. Degrees of certainty will come with greater exploration and closer observation. Hutton is a pioneer in his field of study and it is evident that, short and speculative though his tour is, it is pivotal and has helped established the 'field' of cave and karst science for those who follow. Hutton combines the causal with the aesthetic, a relationship evident as far back as Burnet. However, the sublime aesthetic has developed considerably since the writing of Burnet, and Hutton incorporates this throughout his writing.

Underground Aesthetics.

Hutton writes in his introduction to *A Tour to the Caves* that he is drawn to the 'extraordinary and terrible.' He writes, 'Some may be as much entertained with the profound, as others with the lofty; and some may be as much amused with the sublime, as others with the beautiful' (Hutton, p. 5). Hutton sees the caves through the aesthetic framework of the sublime. As with the other cave visitors, Hutton draws on the ideas of the sublime expressed by Edmund Burke in 1757. Burke argues that to experience terror obscurity is necessary; when we see an object in its entirety much of our apprehension vanishes. The role of light is essential here, particularly the lack of it.[28] Darkness is one of the privations Burke presents as a cause of the terrible, along with vacuity, solitude and silence, all aspects of cave space. Burke also highlights the perpendicular, the vertical plane of perception, the greatest effect of which is depth (Burke, p. 114). Added to cave darkness and illumination by a candle only, the depth can be easily imagined as infinite, however untrue that is (Burke, p. 116). When we experience sensory deprivation through, for example, darkness, when we go beyond the 'sensible qualities of things,' Burke argues 'we go out of our depth' (Burke, p. 160). Fear comes in darkness, not necessarily through the essential lack of light but because it is not possible to know how safe and sure our footing is. On the uneven and unknown surface of a cave, with vertical shafts a common occurrence, such fear is reasonable.

The most immediate, and for a man with a classical Cambridge University education, perhaps most intuitive aesthetic response to the cave environment was through the poetry of Virgil and Ovid, whose descent narrative genre provides the basis for the cave literature of the eighteenth century. Passages from both Latin writers 'crowded into my mind together' as he entered Yordas Cave. As with Savage's poem *The Wanderer*, it is Ovid's Cadmus and the

[28] Edmund Burke, *A Philosophical Enquiry into the Sublime and Beautiful and Other Pre-Revolutionary Writings*, ed. by David Wormersley (London: Penguin, 1998), p.102.

serpent that is first quoted: hidden danger concealed in the darkness of a cave, which is hidden by dense vegetation appears to represent Burke's sublime category of obscurity. Addison's translation presents the context intensely in eight lines: 'a shady wood', 'in its dark bosom stood' 'a bushy thicket, pathless and unworn,' 'o'errun,' 'perplexed,' and 'deep in the dreary den, conceal'd from day' (Hutton, p. 15). In Hutton's glossary of Yorkshire dialect words, he includes the verb, 'to maunder,' to wander as if bewildered, and it appears he is enacting this verb as he descends into the darkness. As Hutton enters the cave he shifts from the descent narrative of Cadmus to that of Cacus, then to Odysseus' descent into the cave of Polyphemus, to Aeneas and the Sybil at the entrance to the underworld and finally he descends with Milton and Satan into hell where he confronts 'darkness visible.' Moments later he crosses the stream (the River Styx) and stops at a junction of cave passages where he once more compares himself to Aeneas, and in Dryden's translation, at the parting of the ways between the road to Pluto's palace and the drop into the depths of Tartarus (Hutton, p. 16). He compares himself to Aeneas again with his descent into Hurtle Pot: 'The descent of Aeneas into the infernal regions came again fresh into my imagination' (Hutton, p. 22). Aeneas is his touchstone again as he descends the deep cave to the Lake of Avernus; Hurtle Pot includes a steep sediment slope to the edge of a large sump pool of dark peat-stained water, overhung by a steep rock wall. On his return up the slope to the surface he quotes some of the most memorable lines of Virgil in Dryden's translation:

> The gates of hell are open night and day;
>
> Smooth the descent, and easy is the way:
>
> But to return and view the cheerful skies;
>
> In this the task and mighty labour lies. (VI, l. 126-9)

In Gatekirk Cave, Hutton imagines Ovid's Acteon peering into the cave of Diana as she bathes. The classical descent narrative has endured throughout the century as an aesthetic representation of the cave and Hutton relies on it. He is later mocked by the reviewer of Wordsworth's Yorkshire Sonnets in *Blackwood's Magazine* (1819) as 'Aeneas Hutton,' the bold and fearless adventurer. Such classical references have become clichéd and stereotypical.[29] It is an interesting point in the development of representations of caves. The descent narrative framework of katabasis and anabasis for a real, physical descent into a cave is unavoidable and remains for most a visceral experience, yet the depictions of mythic gods and monsters is being superseded by the increasingly detached Enlightenment gaze of empiricism and reason.

Being lost in the darkness is one of Hutton's experiences in the caves of Yorkshire, though several of his encounters with caves are of the vertical shafts found on the surface, the potholes. These are seen in daylight and are experienced not by descent but through observation, observation affected by balance as he stands in terror on the brink. Hutton tries to comprehend the depth of the shafts that pass beyond daylight into impenetrable darkness. Measured comprehension fails at this point and the imagination must estimate the cave's proportions. This sublime perspective of depth and darkness takes on a different perspective of a sunlit Alpine mountain and Hutton's observation of Hurtle Pot's shaft and large terminal sump pool is an example of this difficulty:

> What its depth is we could not learn; but from the length of time the sinking stones we threw in continued to send up bubbles from the black abyss, we concluded it to be very profound. How far it extended under the huge pendent rocks we could get no

[29] Anon. 'Three Original Sonnets of Wordsworth: Suggested by Westall's Views of the Caves in Yorkshire' in *Blackwood's Edinburgh Magazine Vol. IV 1818-1819,* p. 471.

> information; a subterranean embarkation having never yet been fitted out for discoveries. (Hutton, p. 23)

The dark, peat-stained water is evidently deep but as it stands at the foot of a deep shaft overhung by trees the lack of light adds to the gloom, giving little chance of observing any depth. What adds to the sublime perspective of the unknown dimensions of this evidently huge subterranean system is the knowledge that it is linked to potholes upstream and resurges at God's Bridge downstream, and that in flood the water upwells with great force to overflow the brim of the shaft and flow along the usually dry valley.

Observation is presented as the visual engagement with material reality though Hutton glimpses the possibility of observation shifting into vision and imagination when peering into the depths of Hurtle Pot's sump pool. Rays of sun pass through the trees above and reflect the pool's overhanging rocks onto the surface, giving the impression of a floor in shallow water. Hutton comments on the illusion and the precarious draw of curiosity: 'But alas! How fatal would be the consequence, if any adventurer should attempt to wade across the abyss on this fallacious principle' (Hutton, p. 25). He identifies the same illusory phenomenon in the mere at the foot of the 'the long, deep and dreadful chasm of Meir-gill.' Similarly, he writes, 'how fatal would be the attempt to wade this abyss in quest of farther discoveries, from this shadow of encouragement?' (Hutton, p. 34). Shadows and illusion can transfix the curious and speculative traveller and explorer, and, not unlike the classical Sirens of Homer's Odyssey, tempt and draw them, irrecoverably, into the depths of the abyss.

This obscurity Burke identifies as a source of the sublime, and Hutton's own understanding of darkness and the imagination, is evident here and at the nearby Weathercote Cave, where Hutton observes, 'Where the eye could penetrate through leaves and branches there was room for the imagination to conceive this cavern more dreadful and horrible, if possible, than it was in reality' (Hutton, p. 26). The enduring example of the

imagination conceiving of infinite depth beyond any reasonable reality is Eldon Hole, one of the 'Seven Wonders of the Peak.' Though descended and measured by John Lloyd and several miners, people still insisted on it being bottomless, the myth being much more sublime than the mathematical reality. Hutton visits the large open pothole of Alum Pot above Selside in Ribblesdale, and compares it to Eldon Hole. He dares not stand on the brink and try to gauge its depth, though he throws a plumb-line down which fails to reach the bottom. He writes that his vertiginous efforts almost overwhelmed him and 'excited the several passions of curiosity, dread, and horror, from the negative knowledge we got of the capacity and depth of this huge pot' (Hutton, p. 44). Staring into total darkness is not going to provide this mathematically sublime experience; there must be some illumination of the dimensions to convey the potential scale. Hutton sees enough of the depth and volume of the shaft before his balance fails him.

An element of aesthetics that Hutton and others produce when admiring a cave-scape is evident in the concept of 'supervenience.' They appreciate the aesthetic view yet the cave-scape is made up of basic non-aesthetic qualities, such as water, mud and rock that in isolation are not sublime. It is the interaction and scale of these base qualities or properties that generate the aesthetic response.[30] Hutton's description of Weathercote Cave is a fine example. He refers to the rocks, boulders, water and moss that create the overall scene, 'we stood some time in silent astonishment to view this amazing cascade' (Hutton, p. 26). The rocks provide the walls of the shaft and the water is transformed from a stream to a cascade. The spray from the falling force of the water creates a rainbow when the sun breaks through the trees. The moss hangs from the damp walls breaking up monochrome uniformity of the limestone and a huge boulder has dropped into the shaft and has been wedged between the walls between the cascade and the observer: 'a huge rock that had sometime been rolled

[30] Emily Brady, *Aesthetics of the Natural Environment* (Edinburgh: Edinburgh University Press, 2003), p. 18.

down by the impetuosity of the stream, and was suspended between us and the top of the cascade, like the coffin of Mahomet at Medina, had an excellent effect in the scene' (Hutton, p. 27). The vertical perspective, the hanging vegetation, the play of light, the sound of the waterfall, its scale and force, the suspended rock mythologized through the simile to prophet's coffin, and the unexplored darkness of the vanishing cave at the foot of the shaft behind the falling water, all merge into one seen, heard and felt experience. Hutton, the observer, is tiny and insignificant in the presence of this 'great wonder of nature' that he believes has been formed through the titanic forces of the biblical flood. His reason and will permit his at once felt and yet detached experience of the cave to be known.

The Field of Cave Geomorphology after *A Tour to the Caves.*

Hutton's *A Tour to the Caves* is a pivotal text written at a decisive time for cave exploration and study. It absorbs the narratives and knowledge of the past and provides a framework to shape the guides and studies that follow. If Hutton established the 'field' of cave and karst science and exploration in West Yorkshire, then it is not only his contemporary travel writers that further aid this, it must be the geographers and travel guidebook writers that do it also. These writers provide a broader readership and have a subsequent impact on people's travel locations and behaviour. Having considered journal accounts of individual experiences in relation to Hutton's *Tour*, this section examines the guidebooks and topographical accounts that described the area more generally.

By 1795 the dissenter, editor of *The Monthly Magazine* and prolific writer, John Aikin, had written *A Description of the Country from Thirty to Forty Miles round Manchester* which was expanded in the 1797 edition into *A Survey of the Counties of Lancashire, Cheshire, Derbyshire, West Riding of Yorkshire and the Northern Part of Staffordshire.* Though not a guidebook in the manner of West or Hutton, more a geographical overview, Aikin's *Description and Survey* reaffirmed the cave and karst 'fields' of study in the West Riding of Yorkshire, along

with the Castleton area of Derbyshire. The section on Yorkshire cave and karst appears under the heading 'Face of the Country' and identifies the key landforms already established by Hutton: the three peaks of Ingleborough, Whernside and Pen-y-ghent, Malham Cove and Gordale Scar, and the main rivers. The caves are briefly referred to:

> Near Chapel-in-the-dale, on the north side of Ingleborough, are other remarkable pits or caverns, containing within them pools of water and cascades, giving birth to subterraneous streams which at length burst out to day. The river Ribble near its origins in these parts tumbles into a deep cavern, and is lost in the bowels of the mountains for three miles, when it emerges and makes its way to Settle.[31]

From the description, it appears Aikin is referring to the Weathercote system and possibly either Alum Pot or Hull Pot as a source of the Ribble. There is no sense in this extract that Aikin visited the caves in person, as the information of their form, function and location is freely available. What is significant about Aikin's book is the attention it gives to the observation of specific landforms in a wider geographical context. This geographical curiosity is the product of repeated, comparable observations about the wild landscape that go way beyond the simple utilitarian observations of Defoe and Johnson.

This attention to geography and the specific landforms of cave and karst regions finds further expression in the remarkable pair of guidebooks written by Sarah Murray in 1799 and 1810. The accounts of women travellers and their perspective on the underground are absent from the records of cave travel and exploration during this period. Murray provides a guidebook to the caves of Yorkshire and Derbyshire, as well as to the mountains of the Lake District and Scotland.[32] She ensures each area is clearly distinguished through its landforms

[31] John Aikin, *A Survey of the Counties of Lancashire, Cheshire, Derbyshire, West Riding of Yorkshire, and the Northern parts of Staffordshire* (London: Stockdale, 1797), p. 121.
[32]Sarah Murray, *A Companion, and useful Guide to the Beauties of Scotland, to the Lakes of Westmoreland, Cumberland, and Lancashire; and to the Curiosities in the District of Craven, in Yorkshire* (London: George Nicol, 1799).

with Yorkshire and Derbyshire visited for their caves. Murray follows the tour established by Gray and Hutton from Kirkby Lonsdale with comments on the Lune and Ribble river valleys, Gordale Scar and Malham Cove. She visits the caves of Chapel-le-dale (Hurtle Pot, Jingle Pot, Weathercote Cave and Great Douk Cave), though she mentions Thornton Force and Yordas Cave in Kingsdale, it appears she does not visit them, as she writes, 'I believe there is no carriage road to these places.' Hutton had remarked about Kingsdale's isolation; the road now taken into Kingsdale had not been laid then (Hutton, p. 13). Given the topographic, aesthetic and phenomenological experiences she describes with the waterfalls of Scotland, it is perhaps surprising to read her description of Weathercote: 'In this cave, which is deep, is a surprising grand waterfall, the effect of it is astonishing to those who have the courage to get at it; but it cannot be described to be perfectly understood' (Murray, p. 28). This could be because the Weathercote waterfall was thoroughly described by other authors while those of Scotland were not.

Murray is drawn to the number of springs she comes across while visiting Maum (Malham) and is curious as to their origins. She writes, 'The greatest curiosity I saw at Maum Tor was the river issuing at the bottom of the rock' (Murray, p. 32). She does not know and does not ask how the water gets there, though she writes that it originates from a lake near the mountain, Pen-y-ghent. The lake must be Malham Tarn though it is separated from Pen-y-ghent by Fountains Fell and Dale Head Pass and it was established at least in the 1730s that the water that sinks out of Malham Tarn rises at Aire Head, not Malham Cove. The water that rises at the foot of the Cove originates from a sink to the west of the tarn on the slopes of Black Hill. The subterranean hydrological phenomena of the area are of interest to Murray as they have been for all visitors. They form a substantial part of what makes this cave and karst area distinct from the landscape of the nearby Lake District.

West's and Hutton's guides provided a fragmentary, eclectic and idiosyncratic tour to both the Lake District and the Yorkshire Dales. They remain remarkable hybrid and experimental guidebooks. In 1800, they were fused into a single coherent tour by John Housman of Carlisle (1764 – 1802), *A Descriptive Tour, and Guide to the Lakes, Caves, Mountains, and other Natural Curiosities, in Cumberland, Westmoreland, Lancashire, and a Part of the West Riding of Yorkshire.* The landforms he, and presumably his prospective readership, are interested in are advertised in the title. Housman's tour does not include speculations on natural philosophy though in the same year he did publish *A Topographical Description of Cumberland, Westmoreland, Lancashire and a Part of the West Riding of Yorkshire.* They are separate, he writes, as people may be interested in one or the other and not both; a single volume would be too expensive and cumbersome. These twin volumes reinforce the notion of the Dales as a field of cave and karst science. Housman's tour is practically the same tour as Hutton's; he must have used it as a guide in the same way he used West as a guide to the Lakes. Housman mistakenly claims that Mr Elishaw, the curate at St Leonard's Church in Chapel-le-dale, is the author of *A Tour to the Caves*; Hutton's name was not included in any of the editions of the book prior to his death in 1806.[33] He writes in the preface that he has included passages from previous guides, made the descriptions more concise, and has corrected any errors. He claims to have removed all exaggerated descriptions of the landscape and replaced them with 'plain and simple language' that aims to give the 'truth and justness' of representation (Housman, 1800a, p. iii).

Housman had recently completed a tour round much of England and Wales between 1796 and 1799 in the company of Henry Howard, owner of Corby Castle, Cumwhitton, near Carlisle. Housman had written a journal of this tour, largely accounting for the agriculture and

[33] John Housman, *A Descriptive Tour, and a Guide to the Lakes, Caves, Mountains, and other Natural Curiosities, in Cumberland, Westmorland, Lancashire, and Part of the West Riding of Yorkshire* (Carlisle: Francis Jollie, 1800a), p. 54.

commerce of the regions he passed through, and it was serialised in the *Monthly Magazine,* whose editor was John Aikin.[34] It was on the strength of this journal that he was encouraged to write his two books on the local mountains, rivers and caves. The two volumes cover the Lake District and Yorkshire Dales in detail though the journal of his tour describes his relatively swift passage through both districts. Housman travels from Carlisle, through Penrith, Shap and Kendal and then onto Kirkby Lonsdale and Settle before leaving the area south by way of Skipton. At Settle he visits Kalecowhole (Kelcow Cave), Attermire Cave and the ebbing and flowing well at Giggleswick. These, along with Jingling Pot in Kingsdale, are the only additions to Hutton's tour (Housman, 1799, p. 63). However, in his *Topographical Description*, Housman includes several small caves in Cumberland, and identifies what is now called Knock Fell Caverns on Cross Fell above Appleby. This system is a rare example of a hypogenic maze cave formed around dense right-angled joints, and a report Housman quotes states: 'Some people, who viewed this place, have found it expedient to adopt the contrivance of Theseus in the Labyrinth, and take a clue of thread with them, to guide them safely in their return, the chambers and passages are so intricate.'[35] This inclusion adds more to the field around Brough and the Stainmore district on the northern border.

Like West's *Guide to the Lakes*, Housman's *Descriptive Tour* went through numerous editions up to 1821; it was widely read and used in the 'field.' As with West, Housman starts the tour from a transport hub and centre of population, in this case Sheffield. For Housman, the tour begins with the caves; these are explored before the traveller arrives in the Lake District. Here he makes use of his 'Tour of England' from the *Monthly Magazine*. This utilitarian discourse that Housman utilizes is that shared by Defoe and Johnson, though where Housman differs is with the new discourse of the appreciation of wild landscape. The first caves he visits

[34] 'Housman's Tour of England' in *Monthly Magazine,* 1796 – 1799.
[35] John Housman, *A Topographical Description of Cumberland, Westmoreland, Lancashire, and a part of the West Riding of Yorkshire* (Carlisle: Francis Jollie, 1800b), p. 84.

are Kalcow Cave and Attermire Cave near Settle, the ones he visited on his previous tour. He describes Attermire Cave almost entirely through its dimensions, though states that it is remarkable and contains some petrifactions. The recurring references to darkness, depth and 'numberless chinks and recesses,' convey the sense of mystery and the ineffable for the curious traveller, and the narrow ledge crossing the cliff into which the cave opens, gives the visit a degree of danger and risk (Housman, 1800a, p. 27).

As with Hutton, Housman observes the karst landforms closely and repeatedly. He too observes the long horizontal scars and benches formed by limestone strata and glaciation, though as with Hutton he is not aware of the role of glaciers. In Kingsdale he observes 'seven tiers of perpendicular naked rocks, with sloping intervals (exhibiting scanty portions of earth) one above another, like the ribs of a skeleton' (Housman, 1800a, p. 35). The path out of Kingsdale into Chapel-le-dale crosses extensive limestone pavements that form the benches above the scars he has just described. Housman observes,

> The moors are partly covered with peat-moss, and partly with limestone rock, so curiously disposed that it seems as if it had been originally poured upon it in a liquid state, spread itself into large plains, and afterwards opened and cracked into the most whimsical forms. Sometimes we meet with circular funnel-like holes, smooth and regular large stones, quite detached, are often observed lying, as if placed by art, on the rocky plain. (Housman, 1800a, p. 40)

Housman is observing a classic karst landscape on Scales Moor. Here, the post-glacial dissolution has formed karren features, the blocks and fissures he mentions, such as clints and grykes, and the funnel shaped hole, which will be a fluted solution doline, and the isolated rocks that are the glacial erratics. He does not know how they formed though he observes the essential characteristics of these karst phenomena. On Scales Moor, there are few allogenic streams running onto the limestone from the upper sandstone slopes of Whernside; the acidic

water that formed this karren phenomena is autogenic, from rainwater. On a dry day, it is hard to see how rain can create such 'whimsical forms.' John Hutton argues in his book that there simply has not been enough rain since the day of creation to form them. Limestone solution has, at this stage, been acknowledged by the geologist, James Hutton, though its effects on the landscape are not yet widely understood. When discussing the hydrology of Gingle Pot in Chapel-le-dale, Housman refers to the article by Adam Walker, found in the Addenda to the second edition of West's *Guide to the Lakes* (it was cut in subsequent editions). Here, Walker describes the fossils that he finds in the strata at Gingle Pot, in 1779, and how they all 'effervesce with an acid […] by the discharge of their fixt air.'[36] This being an acknowledgement of Black's laboratory experiments. Even though Hutton, and, shortly after, Lyle, has applied this corrosive weathering to limestone, the cave, karst and karren features will still require the discovery of paleo-glaciations to be fully understood.

Housman describes in similar detail to Hutton the complex hydrology of the Chapel-le-dale and Weathercote system, Alum Pot hydrology and that of Hull and Hunt Pots on Pen-y-ghent. He visits all the caves mentioned in Hutton's text. Where Hutton writes that he left the caves on Ingleborough's 'Allotment' (the glaciated bench between Alum Pot and Gaping Gill), for another summer's tour, Housman claims they are 'inferior in point of curiosity' to those caves already visited. This is probably so for Housman, as they are all potholes that fall straight from the surface and cannot be entered or descended without ropes and ladders. It is perhaps strange for a modern reader to think that Fell Beck falling into Gaping Gill is not worthy of inclusion.

Omitted from the discourse of the descent narratives in Housman's *Descriptive Tour* are the classical references to Virgil and Ovid, as he writes on the interior of Yordas Cave: 'No

[36] Thomas West. *A Guide to the Lakes, in Cumberland, Westmorland, and Lancashire* (London: W. Pennington, 1780), p. 233.

cave in romance, no den of lions, giants or serpents, nor any haunt of ghosts or fairies, were ever described more frightfully gloomy and dismal than this now before us' (Housman, 1800a, p. 36). For Housman, the mythical and classical descriptions fail to represent the physical reality of the cave. Unlike Hutton, Housman will not include the classics. Classical poetry cannot begin to represent what they experience. Housman, a gardener's son, may not have had a classical education like Hutton's. However, the unavoidable descent narrative and associated sublime aesthetic remain throughout. On approaching Yordas Cave, Housman and his party see loose rocks hanging above them, threatening burial; they can hear, though not see, the waterfall roaring inside the darkness. He writes:

> The roof rises to a height concealed in darkness, and large drops, distilling therefrom, fall among the stones at the bottom with a solemn sound: this, added to the flowing out of an invisible stream, heard just before us, and the slipperiest of loose stones under our feet, rouse our apprehensions for personal safety, and we stop short. (Housman, 1800a, p. 37)

As they descend into the cave, darkness reduces their sight and intensifies their hearing, and, as Burke has identified, this cave darkness ensures they cannot see where they are stepping but they can hear water flowing below them. This is a reasonable concern given that they only had candles to light their way, and their guide, with all their candles, does fall into the stream. After exploring the various passages in the cave, the return, or anabasis, is made with relief:

> We leave the dark excavations with redoubled sentiments of gratitude towards the Almighty, for the blessings he affords us in the light of the sun, which, after being buried for some time in these murky regions, we now enjoy with still greater pleasure. (Housman, 1800a, p. 39)

Housman may not compare himself directly with Aeneas, though here he is brought back, or even resurrected, to the sunlight above by the grace of God after a period of burial in the earth.

As previously noted, the approach to Weathercote Cave is by way of a door built into a high drystone wall bordering the cave from the track to the house above. A bench of stone has also been built into the wall so those about to descend can await their guide (Housman, 1800a, p. 40). It is difficult not to see this as a door into the underworld, and the guide as either the Sybil or Virgil. There is a sign above the door asking the traveller to leave a shilling for the guide, as the recently dead had to pay the ferryman, Charon, to cross the underworld river Styx. Housman conveys the shock of what immediately lies beyond the door:

> The door is no sooner thrown open, than we see, through a grotesque arch of rugged rocks, a large body of water rushing from a square hole and dashing down, among the rocks at the bottom of a vast craggy basin, about sixty feet perpendicular, with a roar that astonishes the most intrepid. This furious river, as if ashamed of exposing its streams to the open day, no sooner makes this frightful leap, then, in a moment, it disappears. (Housman, 1800a, p. 42)

Housman creates a vertical aesthetic with the waterfall, though unlike the vertiginous descriptions of Scottish waterfalls that Sarah Murray provides because he is not balanced at the top looking down it. However, the finely focused perspective through the suddenly thrown open doorway and the following irregular archway of rock provides the reader with not a waterfall but ‘a body of water,’ ‘a furious river,’ ‘rushing,’ ‘dashing,’ ‘leaping’ down a cliff with an astonishing roar. The animation of the waterfall and the continuous aspect of the verbs attempts to place the reader in the position of an irresistible vertical plunge, and no sooner has the shock been delivered than the ‘body’ disappears into the dark depths below. The water enters the subterranean passages and emerges briefly at Gingle Pot and Hurtle Pot

further down the dry valley. The mystery of the unknown depths is carried with Housman down into Hurtle Pot, which he has no warning of until he is on the brink: 'the awful chasm' is another surprise. Having pondered further the unknown extent of the underwater network of passages, Housman provides another experience of the descent narrative:

> On our return from this gloomy cave of despondency, our guide, from the slipperiness of the clayey path, again embraced the earth, and, sliding down, had almost reached the margin of the black abyss before he could recover himself. This accident, however, alarming us, we crawled more cautiously on our hands and knees, and by this means gained the top in safety. (Housman, 1800a, p. 45)

The image of a near helpless figure sliding down a slope of slippery clay to the edge of a deep shaft, in this case filled with water, gives another perspective on the vertical aesthetic. The equally helpless observer must imagine the fear, the slow approach of the inevitable fall into darkness, the blurred vision of the plunge in a space without dimensions.

Housman's *Descriptive Tour and Guide* unites much of West, Cockin and Hutton's inceptive *Guide*, with its eclectic and entertaining blend of texts and discourses, into a single coherent, if somewhat prosaic, practical guidebook. It is Housman's guidebook that resembles more closely the familiar and popular travel guides that were to follow.

Conclusion.

The success and influence of Hutton's guide tells us much about the public engagement with caves in the eighteenth century, through both the experience and exploration of them. The guide acknowledges the limits of visiting and studying a limited number of show caves, that this restriction in exposure to the phenomenon of caves tells us little about the unseen enormity of them. Hutton goes to great lengths to discover more caves in Yorkshire, even if they remain inaccessible: footnotes in later editions of West's guide indicate recently found

potholes on Ingleborough. Hutton pursues the nature of caves' interactions through their hydrology and the local weather patterns; the example of the caves of Chapel-le-dale remains one of the finest subterranean river cave networks in the country. Though he cannot accept the doubt about the biblical-earth chronology, Hutton is aware that caves exist in a different temporality to human history.

The evident intertextuality of Hutton's *A Tour to the Caves* is exceptional; he is a pivotal, though at the time largely anonymous, figure. His book draws on Milton and classical descent narratives, and natural philosophers. His early writings formed the basis of a section of Catcott's *Treatise*; his later writing was published along with the writing of Adam Walker, and he was Wordsworth's early guide, as well as almost all the travellers to the Yorkshire Dales in the late eighteenth century. Hutton, like his fellow cave travellers in natural philosophy, poetry, prose fiction and travel, recognises that caves are compelling and, whether real or imagined, they attract attention.

Chapter Five: William Wordsworth and Caverns of the Mind

Introduction.

In this second case study, I identify William Wordsworth as the writer who transformed the perceptions of caves in the latter part of the long eighteenth century, alongside John Hutton. Wordsworth's poetry has a strong sense of place and landscape, and though the Lake District is most commonly associated with his work, I would argue that the Yorkshire Dales is also a significant place of memory and imagination for him. Wordsworth explored the caves and other distinct karst landscapes of Yorkshire; he wrote about them in poetry and included them in his guidebook to the Lakes. The caves of Yorkshire exposed him to darkness and descent, encounters that formed his expression of the imagination. He was very well read in the tradition of the descent narrative, and, whereas the narratives of the early eighteenth century take place in imaginary caves, Wordsworth's can be traced to the caves of Yorkshire. I want to position Wordsworth alongside the guidebook writers, Hutton and Housman and other fellow Cumbrians, such as Adam Walker and William Westall, alongside the local poets, John Langhorne and William Cockin and the scientists Humphry Davy and Adam Sedgwick. By way of a tentative, literary and, at times, personal co-operation they all transformed the popular idea and understanding of caves. They helped form the 'field' of cave study by simultaneously bordering the area and expanding the number of known caves and their hydrological connections within it. In *The Prelude* Wordsworth expressed the allure of caves, their conscious and subconscious proximity, the 'caverns within my mind' (III, 246),[1] and used their dislocated and deep darkness as a frame for the source of the creative imagination. In this chapter, I will examine the possible sources of Wordsworth's attraction to the underworld and

[1] *Wordsworth: The Prelude. The 1805 Text*, ed. by Ernest de Selincourt and Stephen Gill (Oxford: Oxford University Press, 1970).

the underground, his exploration of caves, his use of the descent narrative and his own experience of Yorkshire caves in his poetry and prose writing, his projection of the Yorkshire caves as a sublime destination for travellers and his shaping of nascent ideas of the subconscious through subterranean metaphors.

Wordsworth's descent narratives and representation of caves are a significant undercurrent in his work, and he knew the tradition well. His reading included the classics, many texts in the original Latin, and others he translated when at Hawkshead Grammar School and St John's College, Cambridge.[2] His engagement with the descent narrative through his reading and translation is considerable. He translated Book III of Virgil's *The Aeneid*, though not the katabasis of Book VI. He had a copy of Christopher Pitt's bilingual version of *The Aeneid*, which also included Warburton's discussion of the Eleusinian Mysteries, associated with Book VI.[3] He read Ovid in Latin, translated 'Orpheus and Eurydice' and read from Nathan Bailey's translation of *Metamorphoses* (Landon, Curtis, p. 637). He had a copy of Xenophon's *Anabasis*. We know he read the plays of Aristophanes, including *Wasps* and *Plutus*, and Dante's *Divine Comedy*, and read Akenside, Thomson, Mallet, Savage and Young. Wordsworth's admiration of John Milton, his 'Great Predecessor,'[4] and *Paradise Lost* is well documented, and many of the allusions and parallel readings have been identified; however, I believe the influence of Milton's descent narrative on Wordsworth's poetry, in this context, is worthy of attention.

Wordsworth's reading of travel writers and their descriptions of topography was also prolific; Defoe, Brydone, Gilpin and Pennant were in his library as was West (and therefore Hutton's) and Housman's guidebooks to the Lake District and Yorkshire Dales. He was familiar

[2] *Early Poems and Fragments, 1785 – 1797, by William Wordsworth* ed. by Carol Landon, Jared Curtis (New York: Cornell University Press, 1997), p. 637.
[3] *The Works of Virgil, in Latin and English Volume III, The Aeneid Books V – VIII* trans. by Christopher Pitt (London: Dodsley, 1753).
[4] 'Letter to Tom Poole, 28 April 1814' in *William Wordsworth. A Life in Letters* ed. by Juliet Barker (London: Penguin,2007), p. 118.

with Thomas Amory's *John Buncle*, further inspired through conversations with his friend, Charles Lamb, an admirer of Amory's novels.[5] Coleridge was a great admirer of Burnet's *A Sacred Theory of the Earth*, and Wordsworth incorporated a quotation from it in *The Excursion*. He owned copies of the natural history books of John Ray. In a letter to the editor of *The Morning Post* in 1844, concerning the Kendal to Windermere railway, Wordsworth refers to both Ray and Burnet as 'our early travellers […] the first men of their age to cross the Alps' and how the appreciation of the sublime aesthetic has changed since their time.[6] He was a friend of the geologists Adam Sedgwick and William Whewell of Cambridge, and the chemist Humphrey Davy, also an enthusiastic geologist, so it is probable he was familiar with the work of Hutton and Lyle.[7] His aesthetic philosophy of landscape was grounded in Locke, Addison, Shaftsbury and Burke. Establishing the context of caves and the descent narrative enables a heretofore different dynamic between these writers.

Initial Descent Narrative: 'The Vale of Esthwaite.'

In this context of the descent narrative, it is important to consider a piece of Wordsworth's juvenilia, 'The Vale of Esthwaite,' a poem written while at Hawkshead Grammar School, though not published by Wordsworth, for his first representation of a descent narrative (Landon and Curtis, p. 422). Duncan Wu has written about this poem from the perspective of Wordsworth being orphaned when still a boy: 'The loss of one's parents in early life, by whatever means, has a profoundly formative influence on the psyche of the surviving child. […] This is the poet who believed that "The Child is Father to the Man."'[8] A key element of the classical descent narrative is the hero's search for his dead father. In the latter half of section one of the poem (211 – 71), the narrator, during a storm, is confronted by a spectre who acts

[5] Duncan Wu, *Wordsworth's Reading 1770 – 1799* (Cambridge: Cambridge University Press, 1993).
[6] William Wordsworth, 'Letter to the Editor of the Morning Post' December 9, 1844 in *William Wordsworth. Guide to the Lakes*, ed. by Ernest de Selincourt (London: Frances Lincoln, 2004), p. 141.
[7] John Wyatt, *Wordsworth and the Geologists* (Cambridge: Cambridge University Press, 1995), p. 71.
[8] Duncan Wu, *Wordsworth. An Inner Life* (Oxford: Blackwell, 2004), p. 1.

as his sibylline guide on a descent into the underworld. It is a gothic fantasy replete with black skeletons, blasted yew trees, moaning wind and dismal light. The spectre appears along with a poet's harp which appears to blend the lyre of Orpheus used in his descent to the underworld to reclaim Eurydice and the magical Golden Bough carried by Aeneas in his descent to meet his father when guided by the Sibyl. The spectre leads the narrator several miles along a dark narrow passage in the mountain, their only light being the ghostly glow of the spectre's bones: 'Like a white shroud that wraps the dead' (Landon and Curtis, p. 442). The mountain Wordsworth chooses is Helvellyn, a mountain formed from volcanic and not limestone rock; however, there had been mines at Greenside, Glenridding, since the 1690s and so he could have been thinking of these, rather than natural limestone caves. Wu suggests that Wordsworth's choice of metaphor for the underworld, 'Black Helvellyn's inmost womb,' is consciously maternal and that the spectre's three waves of his hand over the narrator's head is an act reminiscent of Aeneas's three attempts to embrace the shade of his father in Hades. The metaphor of the 'womb,' in a poem about death, anticipates Wordsworth's metaphor of the 'blind cavern' as the 'very place of birth' (*Prelude*, XIII, 173) of the imagination. As Aeneas sees the shades of all the Greek and Trojan warriors in Hades, Wordsworth's narrator sees the dead warriors of the battle of Dunmail Raise, a mountain pass to the west of Helvellyn, that was fought between the forces of Dunmail, the last king of Cumbria, and Edmund, king of the Saxons in the seventh century. The vision concludes with the narrator stating: 'and since that hour the world unknown / The world of shades is all my own.' Wu argues that 'access to the 'world of shades' is granted so that the dead may be revisited if not reclaimed. […] The episode speaks powerfully of the desire to resuscitate the dead through the power of primitive, elemental forces in nature' (Wu, p. 24). If this is the case then descent narratives for Wordsworth are clearly personal and the transformation of the narrative location from mythic Greece and Italy to his home in the Lake District confirms this.

Wordsworth makes the poem a personal journey when using classical conventions reserved for heroes and demi-gods. The descent is a form of remembering as well as an imaginative reconstruction of mythic and gothic characters and props. It is evidence of a young Wordsworth trying to frame the imaginative search for his dead father, *aletheia* as proposed by Jon Mills, the descent and return as a process of 'unforgetting,' a form of disclosure, of uncovering elements of that which has been concealed over time, such as memories or fantasies.[9]

Early Influences of the Descent Narrative.

'The Vale of Esthwaite' includes an early manifestation of the descent narrative in Wordsworth's poetry. It is evident that further influences of the descent narrative existed in Wordsworth's youth, prior to and alongside his mature writings at the turn of the century. This section explores these influences which pointed towards the search for the source of the creative imagination.

Wordsworth and his social and literary associates were drawn to the descent narrative, or the underworld, as a metaphor for the creative imagination as well as memory and remembering. Coleridge wrote about the source of the imagination most notably in the poem 'Kubla Khan,' of 1798. The story of its creation is based on him falling asleep while reading *Purchas's Pilgrimage*, dreaming of his potential poem and then being awoken by a man on business from Porlock. The representation of the sump and the unknown extent of the flooded labyrinth of caves in 'caverns measureless to man' and 'down to a sunless sea' is possibly the most enduring poetic image of a cave in English literature. The repetition of the suffix '-less' emphasizes the essence of the cave as absence, a void phenomenon, another dark world. The cave is not defined as dark, it is without sunlight, energy and life, and its dimensions

[9] Jon Mills, *Underworlds: Philosophies of the Unconscious from Psychoanalysis to Metaphysics* (London: Routledge, 2014), p. 7.

are beyond the numerical reason of humanity. However, the fountains, or springs, emerge with energy and force from below, from this void earth, and then sink again, and vanish.[10] Herein lies Coleridge's imagination, flashes of inspiration from beneath his level of consciousness, his subconscious. The first use of the word 'subconsciousness' is attributed to Coleridge in the *Oxford English Dictionary*, drawn from his *Notebooks* of 1806. Though it will only become a coherent and recognized concept later in the century, Coleridge, and Wordsworth, join Leibniz and Kant in shaping 'unconsciousness' into a latent state of mind that lies 'below' consciousness. 'Subconsciousness' identifies this state of mind and implies the location, associating it with the subterranean. The term sublime was, of course, in common aesthetic usage though 'subliminal,' as in beneath the threshold, in relation to the 'subconscious' was yet to be introduced. The use of the descent narrative in the literature of these writers framed the origins of memory and the creative imagination in a nascent idea of the subconscious.

The origins of Coleridge's subterranean narrative in 'Kubla Khan' are perhaps more local than *Purchas's Pilgrimage* suggests. Coleridge wrote this poem when he was living near Bristol at Nether Stowey, in Somerset. It was in this city that he borrowed books from, among others, the Bristol Library Society whose librarian was George Catcott (Wu, p. 176). In 1792, Catcott had published his book on his descent and the history of Penpark Hole, near Gloucester, his exploration of the 'hidden recesses of nature.'[11] He describes the 'deep water' in the cavern as made darker by the 'faint glimmering Rays of Light' from above, and quotes Milton from *Paradise Lost*: 'No light, but rather darkness visible' (Catcott, p. 19). Though he measures much of the cave, he enters a chamber so big it is beyond the light of his torch, and so beyond measure. Both observations are perfectly and metrically condensed into a 'sunless

[10] *Coleridge's Poetry and Prose*, ed. by Nicholas Halmi, Paul Magnuson, Raimonda Modiano (New York: Norton, 2004), p. 180.
[11] George Catcott, *A Descriptive Account of a Descent Made into Penpark Hole in the Year 1775* (Bristol: Rudhall, 1792), p. viii.

sea' and 'caverns measureless.' There is no record of Coleridge reading Catcott's book, though in the context it remains an intriguing possibility. Catcott was the brother of Alexander, the author of *A Treatise on the Deluge* that had used Hutton's article on the caves of Ingleborough, and who had also been the student of natural philosopher John Hutchinson. Hutchinson, had been himself a student of John Woodward, who had sparked the debate between himself and Thomas Burnet over the origins of rock strata after the catastrophic biblical flood. Robert Southey and Humphry Davy were also members of the society and borrowed books. This is quite a lineage, and, though tenuous, establishes a trace between Burnet, the author of the first book in English to attempt a systematic explanation for the origin of caves, and Wordsworth and Coleridge.

Robert Southey created a more conventional descent narrative to the underworld in the ninth book of his 1795 epic poem, *Joan of Arc*, and then reworked the section, with the aid of Coleridge, into the poem in 1799, *The Vision of the Maid of Orleans*.[12] The character, Joan, descends to the underworld with her Sibylline guide, Theodore, and, like Odysseus and Aeneas before her, meets with the dead and their tormentors. The topography of Southey's underworld is like the classic accounts and those of Dante. Southey's Joan has a nightmare vision of a journey over a desolate moorland landscape to the stagnant shores of a lake where a boat, and its female Charon, ferry her to the other side, the moon all the while creating the, now familiar, 'darkness visible' of Milton, and John Hutton's Yordas Cave, recorded in his 1780 *A Tour to the Caves*. She is led through the ruins of an abbey and images of death and decay, such as the yew tree, the owl, ivy, moss, abound. She is taken down through a doorway and a flight of broken stairs to confront death and meet her guide to the underworld, Theodore. This is the point of essential dislocation, of displacement: the transformative passage into an unfamiliar world. She is taken further down through a labyrinth of caverns and is given the

[12] Robert Southey, *Poems 1799* (Poole: Woodstock Books, 1997), p. 5.

opportunity to peer into the abyss where she sees the 'Dark gleaming to the light of far-off flames, / More dread than darkness' (Southey, p. 31). She passes through numerous caverns each housing fiendish representatives of the seven deadly sins and added variations until she is led up to Love's Palace and the promise of paradise. It is a blend of descent narrative tropes and the subconscious fear and guilt of nightmares. The underworld remains a vague generalised landscape, the key features being an open and dark wilderness without shelter and a labyrinth of increasingly deep caverns. In descent narratives like these the quest is to witness 'the sacred depths of wisdom' (Southey, p. 65) and the landscape is the stage where it unfolds. All that can distract, or become the focus of observation, is absent; any form of familiarity, comfort or stability is not here. The voyager is displaced and alone. There is no specific detail of the landscape, other than symbols of death and decay, with suggestions of dislocated life and renovation; the details are in disclosures of truth and wisdom that can be learnt and remembered. What is important for the narrative is a landscape that overwhelms, that provides darkness, disorientation, privation, solitude and exposure, and the underground still appears most the appropriate place.

The Cave as Displaced Space.

The descent narrative plays a crucial part in Wordsworth's poetry, as does a sense of place. The descent into the alien environment of the underground generates what Edward Casey refers to as a 'displaced' or dislocated space.[13] Such a space must be experienced differently from the familiar spaces above ground, and Wordsworth and his contemporaries sensed this difference when writing about cave space. It was Wordsworth, however, who drew this sense of place away from the classical clichés of the eighteenth century poetic muse, into a more personal, psychological and imagined experience.

[13] Edward S. Casey *Getting Back into Place: Towards a Renewed Understanding of the Place-World* (Bloomington: Indiana University Press, 2009), p. 195.

In Wordsworth's poem, 'Lines written a few miles above Tintern Abbey,' he refers to a 'presence' in nature that impresses itself on his consciousness, a sense he refers to in the same poem as his 'genial spirit.' He places this spirit in the underground and associated hydrology in the 1799 *Prelude*, 'Ye powers of earth, ye genii of the springs' (I, 186).[14] This 'genius of place' has its precedence in the place poems of the eighteenth century, and, in this context of the Lake District and the Yorkshire Dales, in the place poems of John Langhorne and William Cockin, the writing of both would have been familiar to Wordsworth. Langhorne, a clergyman, who, in 1735, was born in the village of Winton, and brought up in Appleby, in Westmorland, wrote the poem, 'Ode to the Genius of Westmorland.' The ode was included as a footnote in the second edition of West's *Guide to the Lakes* by its editor, William Cockin. It follows the classic style with an initial invocation to the spirit of the place, the muse, 'Hail, hidden Power of these wild groves, / These uncouth rocks and mountains grey.' The 'hidden' power, the 'presence' of the place are concealed in the 'recesses of nature,' as the second stanza reveals:

> In what lone cave, what sacred cell,
>
> Coeval with the birth of time,
>
> Wrapt in high cares, and thought sublime,
>
> In awful silence dost thou dwell?[15]

Though a highly conventional poem, Langhorne places his spirit in silence and seclusion in a cave, high in the sublimely wild mountains. The sense, or genius, of place was further emphasized by Cockin, who wrote a long poem called 'Ode to the Genius of the Lakes in the North of England,' which was published in 1780 following the publication of the second edition

[14] *The Prelude 1799, 1805, 1850. William Wordsworth*, ed. by Jonathan Wordsworth, M. H. Abrams and Stephen Gill (New York: Norton, 1979).
[15] Thomas West. *A Guide to the Lakes, in Cumberland, Westmorland, and Lancashire* (London: W. Pennington, 1780), p. 170.

to West's *Guide*. This book states in its advertisement that it hopes to attract 'actual tourists' and reminds them that they can buy the new, expanded second edition.[16] This is another conventional place poem in the classical style, and that of Langhorne, with the usual invocation to the muse, the 'Genius of the Lakes.' The muse generates 'dorian lyres,' 'sylvan groves,' 'Elysian flowers,' and 'Flora's host,' and sometimes hides in the 'grotto's dim recess.' Langhorne is mentioned as a worthy of the lakes, and both Claude and Rosa are praised for the way their art has inspired ways of seeing the landscape. In the 1793 fifth edition of West's *Guide*, Cockin added 'Address to the Genius of the Caves' to John Hutton's 'A Tour to the Caves' in the Addenda. The poem is anonymous, though the author is likely to be Cockin as the conventional classical style of his 'Ode' is mirrored throughout. The invocation hails the 'Spirit dread' and evokes 'melting Iris' vernal tinctur'd bow,' and 'bright-ey'd Fancy's dewy plume.' The muse is asked to 'awake the soul / To feelings more ennobled, than the lyre / Of Orpheus' (West, p. 282). Further subterranean sublimity from an acoustic, Orphean scale is evoked with the 'dread abyss / Of some unfathomed cavern,' referring to Gingling Cave (Jingling Pot) on the mountain of Gragareth where 'Echo's groans, / With many a dreary pause between, from rock / To rock rebound, and break upon my ear / Like distant thunder,' itself echoes Thomas Dixon's place poem to Ingleborough and the River Wenning of 1781. When Dixon visits Gingling Cave and throws rocks down the shaft, he notes:

Its form and depth the curious ne'er could prove;

The falling stones from rock to rock rebound,

The dark abyss returns a tinkling sound.

[16] William Cockin, *Ode to the Genius of the Lakes in the North of England* (London: Richardson and Urquhart, 1780), p. 4.

For Dixon, the distant 'growl' is in nearby Routing Chasm (Rowten Pot).[17] Cockin further adds the 'foaming cataract' at Weathercote and the 'secret shrine' of Yordas. The karst and karren rock formations of the Dales are 'wild fantastic forms.' He concludes the poem in his 'Egerian cave,' (cave spring or resurgence) with a plea to the 'sacred presence' of the muse to help him use 'science' footsteps' to better understand nature. The appeal to the muse combines the causal and aesthetic approach to cave knowledge that typifies the cave travel writing of the period.

Though these poems appeared in the new hybrid form of eighteenth-century travel writing, the style of Langhorne's, Cockin's and Dixon's attempts to create the spirit, or essence, of a place had already been heavily criticised by John Aikin who in 1777 published *An Essay on the Application of Natural History to Poetry*. He condemned such poetry as this as insipid and feeble; it was cliched. He argued that the reader of poetry is 'wearied and disgusted with a perpetual repetition of the same images, clad in almost the same language.'[18] Aikin was amazed that these writers who professed to love and admire nature were not actually seeing it, perhaps not even looking at it. He writes:

> The grand and beautiful objects which nature everywhere profusely throws around us, are the most obvious store of new materials to the poet, it must also be confessed that it is the store which of all others he has most sparingly touched.

He quotes the critic, Joseph Warton, who writes that painters also copy the pastoral images of Theocritus without ever looking at nature themselves. Though Langhorne, Cockin and Dixon lived in and travelled extensively in the Lake District and Yorkshire Dales, and they did look at real objects in nature, Aikin would argue that they did not look closely enough or often enough. As the natural philosophers working in the field argued, cursory glances at the

[17] Thomas Dixon, *A Description of the Environs of Ingleborough, and Principal Places on the Banks of the River Wenning* (Kendal: Ashburner, 1781).
[18] John Aikin*, An Essay on the Application of Natural History to Poetry* (Warrington: Eyres, 1777), p. 2.

elements of nature were simple and shallow curiosity, whereas detailed repetition and comparison of observation was the kind of curiosity that provided meaningful knowledge. The place poets utilized the 'presence' or 'spirit' in the landscape, particularly underground; they experienced the sublime; they believed that both the imagination and science would provide a better understanding of nature, or 'the harmonious maze of sacred order.' The problem they had was that they did not have the language to express all of this.

Wordsworth saw the sublime through the effect the landscape had on the observer, the person experiencing the encounter; he also saw the genius or spirit of the place as coming from the observer of the place, not the place itself. In this simple though radical step, Wordsworth transformed the way that caves were represented in poetry. For him, the inspiration is a suitable element of the natural world that which he breathes, for example the 'breeze' that brushes his cheek at the start of *The Prelude*. Within him it corresponds to a 'creative breeze […] a tempest, a redundant energy' (I, 43 - 46) that enables him to compose his verse. With this shift of perspective, Wordsworth has removed the clichéd deities. Ironically, Jon Mills argues that for the philosopher Heraclitus, and the ancient Greeks, a spirit or shade in the underworld is divested of its senses though it maintains its sense of smell through breathing and smelling through the nose. A breath or a breeze is the essence of existence in the underworld (Mills, p.6). Wordsworth does not attribute his 'breeze' to Greek deities; it arises from an acute observation of the natural world of which he is a part. He 'breathes again' (I, 19) and 'trances of thought' come upon him, unbidden.

This transformation can be further identified in the way Wordsworth adapts a common phrase that writers, since at least Burnet and Woodward, have used or adapted to describe caves, or concealed aspects of nature, the ineffable essence of place. John Hutton, in

A Tour to the Caves, writes of 'the hidden recesses of nature.'[19] George Catcott uses the same phrase in his description of Penpark Hole, and Mary Shelley will later use it in *Frankenstein*: 'They penetrate into the recesses of nature, and show how she works in her hiding places.'[20] It is a phrase redolent of the pursuit of knowledge during the eighteenth century. It is a phrase that suggests a degree of obsessive and audacious curiosity into something that was hidden for a purpose. Shelley presents it as an aggressive violation. It certainly carries with it a sense of the forbidden knowledge conveyed by Milton in *Paradise Lost*: 'Solicit not thy thoughts with matters hid, / Leave them to God above' (VIII, 167 – 8). For Percy Shelley, on the other hand, it was poetry that 'lifts the veil from the hidden beauty of the world.'[21] In *The Prelude*, Wordsworth writes, 'The hiding-place of my power / Seems open' (XI, 335 – 6) when trying to account for the appearances of the 'spots of time' from his subconsciousness. When later expressing the creative imagination and its source he writes, 'The prime and vital principle is thine / In the recesses of thy nature' (XIII, 193 - 4). For Wordsworth the pursuit is inward, into the 'Caverns within my mind.' (III, 246) In these 'caverns' there is no light yet from within emerges memory and imagination.

The 'spot of time' from his youth that perhaps best exemplifies this rising of thought and memory from darkness, is the Ullswater 'Boat-stealing' episode from The Prelude, where the boat is in a 'rocky cave' (I, 375), or the 'cavern of the willow-tree,' (I, 395) on the side of the lake. The feelings which trouble his mind and dreams are described as 'unknown modes of being' (l. 420), 'darkness – call it solitude / Or blank desertion,' 'no familiar shapes' (l. 421 - 2). This experience of embarking on a passage out of a subterranean darkness and then

[19] John Hutton, A Tour to the Caves in the Environs of Ingleborough and Settle (Wakefield: S R Publishers, 1970), p. 45.
[20] Mary Shelley, *Frankenstein. 1818 Text* ed. by Marilyn Butler (Oxford: Oxford University Press, 1998), p. 30.
[21] Percy Shelley, 'The Defence of Poetry' in *Shelley's Poetry and Prose* ed. by Donald Reiman and Neil Fraistat (New York: Norton, 2002), p. 517.

returning to it, is characteristic of Wordsworth's creative process, the discovery of 'found,' or glimpsed memories.

I have so far explored the shaping of Wordsworth's thought about descent narratives and caves through the literature of the eighteenth century and by earlier classics. His more thorough and engaged writing about caves in *The Prelude,* will be discussed in later sections. Before the writing of *The Prelude*, however, Wordsworth employed the descent narrative motif in his poem, *Peter Bell*.

Later Descent Narrative: *Peter Bell.*

In this section, I present my reading of *Peter Bell* as a descent narrative, a more mature expression of the form than that found in 'The Vale of Esthwaite.' *Peter Bell. A Tale* was written by Wordsworth in 1798, and published in 1819, so sits with the Alfoxden period of his life, after 'The Vale of Esthwaite,' before *The Prelude*, though very close to the first two-part version, and alongside the composition of Coleridge's 'Kubla Khan' and Southey's *Visions of the Maid of Orleans*. The poem is dedicated to Southey. The tale is a trace, or palimpsest of a descent narrative, or perhaps a passage narrative, as Peter Bell must cross the threshold into another consciousness. There is a glimpse of a more conventional descent narrative included, the Wood-boy (named Robin in the first draft) searching for his dead father.

The character, Peter Bell, is presented by Wordsworth as a wild rover who travels the country selling earthenware and who has twelve wives. It is said 'to see him is to fear him.'[22] The tale of his discovery of the ass and the dead man is set in the Yorkshire valley of the River Swale, and as John Wyatt has observed, a river cutting through a limestone karst landscape (Wyatt, p. 23). The landscape is only important, however, in that it presents the moonlit images that haunt and disturb the 'spirits of the mind,' or conscience of Peter Bell.

[22] *Peter Bell by William Wordsworth* ed. by John Jordan (New York: Cornell University Press, 1985), p. 67.

Wordsworth echoes the tales of both Dante and Virgil and their descent narratives, and, I would also argue, he is further influenced by the descriptions of local cave and karst landscapes in the writing of John Hutton and William Cockin.

Like Dante's *Inferno*, Bell's tale begins with him lost amid a dark wood, and at 32 years old, in the middle part of his life. The path he has been following in the moonlight is not what he expected, as it takes him deeper into the wood and dale: 'There's little sign the treacherous path / Will to the road return!' (l. 364 – 5). He is forced to press on through the undergrowth until the path ends and he is lost. Cary's translation of *Inferno* opens with this moment,

> In the midway of this our mortal life,
>
> I found me in a gloomy wood, astray
>
> Gone from the path direct: and e'en to tell,
>
> It were no easy task, how savage wild
>
> That forest, how robust and rough its growth. (Canto I, lines 1 – 5)[23]

This sense of bewilderment and disorientation in Dante's poem points towards the descent into the displaced and dislocated strangeness of the underworld. The eroded limestone of the Swale forms 'shadows of strange shape, / Massy and black,' 'yawning fissures,' 'grey rocks and winding crags,' 'hoary cliffs' and 'rocks staggered all around.' As well as Dante's narrative, Wordsworth's descriptions of the landscape are comparable to those given by Hutton in his guide to the caves of Yorkshire. Amid the rock enclosed wood, he enters a glade and meets the guide who will lead him through his 'passage.' The guide is no conventional Sibyl or spirit of a poet, it is the ass. In his dedication to Southey, Wordsworth made it clear that he was not going to rely on any supernatural elements:

[23] *Dante's Inferno* trans. by Henry Francis Cary (Chicago: Thompson & Thomas, 1966), p. 9.

> The Poem of Peter Bell was composed under a belief that the Imagination not only does not require for its exercise the intervention of supernatural agency, but that, though such agency be excluded, the faculty may be called forth as imperiously, and for kindred results of pleasure, by incidents, within the compass of poetic probability, in the humblest departments of daily life. (Jordan, p. 41)

The spectre of 'The Vale of Esthwaite' has gone, and whatever visions Peter experiences, the narrator explains them as products of 'spirits of the mind,' his conscience. Wordsworth adapts Dante's and Virgil's descent narratives into a passage narrative that is more practical and probable given the journey on the ass to the dead man's cottage, and the meeting with his wife and seven children.

Dante's narrative has the ferryman, Charon, gather the shades of the dead into his boat to cross the River Styx with his oar, and deposits them on the far shore; Wordsworth's Peter Bell pulls the corpse out of the deep river pool with his staff twisted round the man's hair, and heaves him onto the shore. The acknowledgement of the actual descent into the underworld is conveyed by Peter's view of the Wood-boy, the dead man's son. He hears a cry 'that rings along the wood, […] that floats adown the flood' (l. 673 – 4), and comes from the entrance of a nearby cave where he sees the Wood-boy:

> Holding a hawthorn branch in hand,
>
> All bright with berries ripe and red;
>
> Into the cavern's mouth he peeps –
>
> Thence back into the moon-light creeps;
>
> What seeks the boy? – the silent dead! (l. 681 – 5)

Here the inspiration shifts from Dante to Virgil as the Wood-boy approaches the entrance to the underworld in search of his dead father. The boy holds a hawthorn branch bright with

berries and not with flame as he searches in the dark. An immediate analogy is the Golden Bough of Aeneas, the branch that is sacred to Proserpine in Hades and which will permit Aeneas to descend and see the shade of his father, and, crucially, later ascend back to the land of the living. Robert Graves in his exploration of myth and folklore, *The White Goddess* (1948), presents the symbolic significance of the hawthorn through the Celtic Tree Alphabet as the 'May tree' associated with the month of May. Though the spring is a time of fertility and regeneration, the month of May was perceived as an unlucky month and inspired the proverb, 'Ne'er cast a clout ere May be out,' (do not put on new clothes until the unlucky month is over, or do not take off your clothes).[24] The tradition, according to Graves, also suggested that May was an unlucky month in which to be married, so the hawthorn was the tree of enforced chastity. Jill Marie Treftz, in her study of Cumbrian folklore and the hawthorn, identifies the tree both as a harbinger of death, and as associated with 'places of trial and courts of justice.'[25] This is an interpretation used by Seamus Heaney in his poem, 'The Haw Lantern,' which draws on Celtic folklore calling the hawthorn 'a small light for small people,' and extends it to Greek myth with Diogenes, with a haw lantern, looking for 'one just man.'[26] Both Graves' and Treftz' interpretations are useful in that Robin's search is hopeless as his father is dead and that the experience Peter undergoes converts him from a lascivious abuser of women to a good and just man.

The hawthorn is a native species across Britain, particularly common in Swaledale, and, as is evident from the work of Graves and Treftz, rich in symbolic meaning. This, along with Peter's staff and the River Swale, enables Wordsworth to avoid any supernatural references to items such as the Golden Bough, Charon and the River Styx and use common

[24] Robert Graves, *The White Goddess: A Historical Grammar of Poetic Myth* (London: Faber and Faber, 1999), p. 169.
[25] Jill Marie Treftz, 'The Significance of the Hawthorn Branch in Wordsworth's Peter Bell' in *ANQ: A Quarterly Journal of Short Articles, Notes and Reviews,* 2013 26: 1, 27 – 30.
[26] Seamus Heaney, *New Selected Poems 1966 – 1987* (London: Faber and Faber, 1990), p. 217.

and familiar objects that reinforce the sense of place, though they do underpin the narrative throughout. Such a sense is further enhanced by the passage upon which the ass then takes Peter. The ride leads him through the narrow, forested valley which is lined on either side by karst cliffs eroded by rain water into fluted pinnacles:

> The rocks that tower on either side
>
> Build up a wild fantastic scene;
>
> Temples like those among the Hindoos,
>
> And mosques, and spires, and abbey windows,
>
> And castles all with ivy green! (l. 726 – 730)

John Wyatt refers to this stanza as an example of Wordsworth's observation and incorporation of karst features into his poetry. I would argue that the stanza also echoes the line in William Cockin's poem, 'Address to the Genius of the Caves,' when he describes the same kind of karst features on the mountain Gragareth, south of Swaledale, as 'wild fantastic forms.' Wordsworth had a copy of West's *Guide to the Lakes* and possibly read this poem in the addenda section, attached to Hutton's 'A Tour to the Caves.' However, the attention to such details by Wordsworth is to establish a sense of place, a recognisable locality for the conversion of his folk hero. The 'wild fantastic scene' conjures images of religious architecture in his imagination, and the 'spirits of his mind,' or his conscience, overwhelm him with guilt. The drops of blood from the wound on the ass, which Bell inflicted, intensify the scene further. His guilty conscience forms 'dread spirits' but he does not give into them, preferring to laugh off the strange events and atmosphere, and idly knock upon his tobacco tin. When he does this, the ass appears to grin at him; he grins back and immediately he hears and feels a rumble from deep in the earth. Wordsworth is quick to inform the reader that the sound comes from miners blasting twenty fathoms underground (l. 890), though Peter does not know this and

he believes the earth is about to open for him. Like Aeneas seeing the shade of Dido in Hades, after she has committed suicide because of him, Peter imagines the Highland girl he marries, abandons and who then dies when pregnant.[27] Aeneas tries to persuade Dido to believe that the gods made him leave her; Peter, meanwhile, imagines the girl dying and calling for her mother, while he says nothing:

> The sweat pours down from Peter's face,
>
> So grievous is his heart's contrition;
>
> With agony his eye-balls ache
>
> While he beholds by the furze-brake
>
> This miserable vision! (l. 981 – 5)

The passage concludes with the ass taking him to the dead man's cottage where he meets his wife and children, including Robin. He helps return the body of the man for burial and weeps in sadness at the grief he sees. With such sudden death, there is no time for preparation, and recognizing the anguish and grief he has caused and then witnessing such love and loyalty, Peter searches for redemption. Perhaps like Dante meeting Beatrice in Paradise, his vision of the widowed woman and her children seals his conversion:

> And Peter Bell, who, till that night,
>
> Had been the wildest of his clan,
>
> Forsook his crimes, repressed his folly,
>
> And, after ten months' melancholy,
>
> Became a good and honest man. (l. 1181 – 5)

[27] *Virgil's Aeneid Translated by John Dryden*, ed. by Frederick Keener (London: Penguin: 1997), p. 164.

In this poem, Wordsworth has dispatched all the classical references used with such enthusiasm by Hutton in his *A Tour to the Caves*. Gone are the external spirits or deities of the landscape and rhetorical invocations and gone is the generalized underworld. Though he has been influenced by Hutton's cave and karst descriptions of Yorkshire, Wordsworth has introduced symbols from local folklore, localities in recognizable landscapes, humble characters and animals, language in a plain style and its transformation through the power of imagination. The poem prepares the ground for what is to come in *The Prelude.*

A Journey towards *The Prelude*.

The descent narratives Wordsworth had written before his move back to live in the Lake District were drawn from myth and literary precedence and knowledge of surface and subterranean landforms of the Lake District and Yorkshire Dales. However, descent narratives were beginning to change in that the narratives were not only features of the imagination but attempts to locate its source. While living in Grasmere, Wordsworth made several journeys to specifically visit the Yorkshire caves. Wordsworth drew on his experiences of this cave exploration to establish the cave as a fundamental image in his poetry.

With relatives living in Yorkshire he was familiar with the county throughout his youth; he refers to his stay there in the summer of 1789 when on vacation at Cambridge in Book VI of *The Prelude*:

> In summer among distant nooks I roved,
>
> Dovedale, or Yorkshire Dales, or through bye-tracts
>
> Of my own native region. (VI, 208 – 10)

The 'nooks' of the Yorkshire Dales could be any hidden, remote or enclosed recess, and the bye-tracts, secluded and unfrequented paths, in valleys such as Swaledale, Wensleydale, Kingsdale or Chapel-le-dale. With the old county boundaries of Westmorland, Lancashire and

Cumberland, the division of the Lake District and the Yorkshire Dales was not as categorical as it currently is. As has already been mentioned, the limestone of the Yorkshire Dales does encompass the Lake District as the geological phenomenon known as the Cumbria Ring. What now creates the more emphatic distinction are administrative boundaries and the transport links. In the eighteenth century, the pass at Shap was comparable and as functional as those at Kirkstone and Dunmail, and Stainmore and the Eden Valley to the east were as much a part of Penrith as Ullswater and the River Eamont to the south-west.

Further evidence of Wordsworth's experience of the Yorkshire underground and its formation, and the impact it had on his imagination, appears in Wordsworth's letter to Coleridge, on Christmas Eve, 1799, describing his and Dorothy's journey from Sockburn in County Durham to Dove Cottage, Grasmere, which takes him through the Dales by way of Wensleydale. When he and Dorothy arrive at point that is eight miles outside of Richmond, they decide to 'foot it' as far as Kendal. Beyond the small town of Askrigg they stop at the Green Dragon Inn at Hardraw to visit the waterfall there, described in Hutton's *Tour* by Mr Elishaw, the Chapel-le-dale curate. He and Dorothy walk to the foot of the waterfall in winter and so it is partially frozen. The spray from the fall covers the rocks surrounding the basin in ice and icicles hang from the cliffs that form the waterfall. The top of the cliff overhangs the base forming a high ceiling that Wordsworth likens to a cave, from this position it is possible to stand behind the waterfall and look out through it. He describes the cave:

> The rocks on each side, which, joining with the sides of the cave, formed the vista of the brook were chequered with three diminutive waterfalls or rather veins of water each of which was a miniature of all that summer and winter can produce of delicate beauty. The rock in the centre of these fall where the water was most abundant, deep black, the adjoining parts yellow white purple violet and dove colour'd, or covered with water-plants of the most vivid green, and hung with streams and fountains of ice

> and icicles that in some places seemed to conceal the verdure of the plants and the variegated colours of the rocks and in some places to render their hues more splendid.[28]

Here Wordsworth describes a cave of light, colour, beauty and shelter. Though it is not a deep cave, more a large recess in the cliff, and does not progress beyond sunlight, he is insistent on calling it a cave. The cave as Wordsworth describes it is contrary to all the conventional descent narrative fears and sublime darkness and privation. This cave enables you to see; here Wordsworth stands in the near darkness and looks out at what lies beyond. The rocks on either side direct their vision and what Wordsworth and Dorothy see is beautiful, rather than sublime, not darkness but an abundance of colour and displays of light. Wordsworth concludes his description of the cave through an imaginative transformation: 'In the luxury of our imaginations we could not help feeding on the pleasure which in the heat of a July noon this cavern would spread through a frame exquisitely sensible.' This cave 'feeds' the senses and imagination; in this cave, the descent enables you to return with vision.

Dorothy Wordsworth's *Grasmere Journal* begins at the point, five months later, when William and their brother John, return to the Yorkshire Dales and spend a month there. It is this absence after recently arriving at Grasmere that inspires Dorothy to write her journal:

> May 14 1800. Wm & John set off into Yorkshire after dinner at ½ past 2 o'clock – cold pork in their pockets. I left them at the turning of the Low-wood bay under the trees. My heart was so full that I could hardly speak to W when I gave him a farewell kiss. […] I resolved to write a journal of the time till W & J return, & I set about keeping my

[28] *Letters of William Wordsworth* ed. by Alan Hill (Oxford: Oxford University Press, 1984), p. 39.

> resolve because I will not quarrel with myself, & because I shall give Wm Pleasure by it when he comes home again.[29]

As it stands, a journey 'into Yorkshire' is a form of descent narrative, as Dorothy mourns the departure of William and John and longs for them to return. However, in a letter Dorothy wrote to Jane Marshall in September 1800, she mentions that the journey did involve descending into caves: 'William and John were in Yorkshire last summer, at Gor Dale, Yordas, etc., […] and were absent a whole month.'[30] The trip is defined as a journey to caves. He wrote in Book III of *The Prelude*, of his time at Cambridge:

> Caverns there were within my mind, which sun
>
> Could never penetrate, yet did there not
>
> Want store of leafy arbours where light
>
> Might enter at will. (III. 246 – 9)

This is reminiscent of both Leibniz' and Kant's metaphors for the subconscious mind. Leibniz contemplates how far 'our past and forgotten awareness' extends and whether it is accessible. He calls these aspects of the mind, 'minute perceptions.' The metaphor he uses is that of the underground, with the suggestion of a mine: 'So why could we not also provide ourselves with objects of thought from our own depths, if we could take the trouble to dig there?'[31] Kant's 'obscure representations' appear to be equally subterranean; they form the immense 'field of sensuous intuitions and sensations of which we are not conscious.' 'Clear representations' are accessible to the conscious mind and 'contain only infinitely few points of this field which lie

[29] Dorothy Wordsworth *The Grasmere and Alfoxden Journals* ed. by Pamela Woof (Oxford: Oxford University Press, 2002), p. 1.
[30] *The Letters of William and Dorothy Wordsworth Vol. I. The Early Years 1787 – 1805* ed. by Ernest de Selincourt (Oxford: Oxford University Press, 1967), p. 298.
[31] Gottfried Leibniz, *New Essays on Human Understanding* trans. by Peter Remnant and Jonathan Bennett (Cambridge: Cambridge University Press, 1996), p. 53.

open to consciousness; so that as it were only a few places on the vast map of our mind are illuminated.'[32] The subconscious appears as a vast subterranean map, or labyrinthine network of caves or dense forest, with points of luminous entry by way of chance discovery, or, as Leibniz and Wordsworth suggest, through active and wilful exploration. Wordsworth also remarks that the caverns of the mind cannot be accessed freely. This is a metaphor and understanding echoed by Shelley in 1814: 'The caverns of the mind are obscure and shadowy; or pervaded with a lustre, beautifully bright indeed, but shining not beyond their portals.'[33] (It is worth noting here that Shelley's teacher at Syon House in 1802, and the one who inspired his imagination, was Adam Walker.[34]) Wordsworth articulates these moments as 'spots of time,' as described in Book XI of *The Prelude*:

> This efficacious spirit chiefly lurks
>
> Among those passages of life in which
>
> We have had deepest feeling that the mind
>
> Is lord and master, and that outward sense
>
> Is but the obedient servant of her will. (XI, 269 – 273)

Wordsworth argues that these spots of time are 'scattered everywhere' though are consciously unattainable unless through the subconscious restorative power of the mind. Philosopher and psychologist, Jon Mills, writes about the subconscious as perceived by ancient Greek philosophers as that which we see always emerging from a veil of hiddenness; he quotes Heraclitus: 'Nature loves to hide,' and Anaxagoras: 'Appearances are glimpses of the

[32] Immanuel Kant, 'Anthropology from a Pragmatic Point of View' in *Anthropology, History and Education* trans. by Gunter Zoller, Robert Louden (Cambridge: Cambridge University Press, 2007), p. 247.
[33] Percy Shelley, 'Speculations on Metaphysics' in *Essays: Letters from Abroad, Translations and Fragments,* 2 vols, ed. by Mary Shelley (London: Edward Moxon, 1840), I, p. 246.
[34] Richard Holmes, *Shelley: The Pursuit* (London: Harper Perennial, 1974), p. 16.

unseen' (Mills, p. 7). This eruption from the depths has been invariably destructive, for example, Freud used lines from a speech by the goddess, Juno, from Book VII of *The Aeneid* as the epigraph for his *The Interpretation of Dreams* (1900), translated by Dryden as 'If Jove and Heaven my just Desires deny, / Hell shall the Power of Heaven and Jove supply.' (VII, 432 – 3) Juno intends to stop the advance of Aeneas and his forces in Italy. She unleashes the Fury, Alecto and her 'dire sisters from their dark Retreat' deep in the underworld, who are hated even by Pluto / Hades. Freud has selected a dynamic quotation from Virgil, expressing the reluctant and restricted powers of the conscious mind and the overwhelming force of what lies hidden below. However, for Wordsworth, the emergence of previously hidden memories, what he has called 'spots of time,' can heal and restore, as well as disturb and destroy. When describing how the 'hiding-places of his power' are opened, Wordsworth states that 'I see by glimpses now,' (XI, 337) reminiscent of Anaxagoras' 'glimpses of the unseen.' It is in this poetry that Wordsworth's experience of the darkness of the underground is clearly evident.

This is reflected in his imaginative interpretations of physical cave experiences in Yorkshire. He continued to make visits to the Yorkshire caves. Mary Wordsworth, in a letter to Thomas Monkhouse in 1821, writes: 'Wm is out at present on an excursion with our neighbour Mr Quillinan, to the Caves, York, etc.'[35] Wordsworth knew these caves well enough to act as a guide for others, in this case, his daughter's future husband, Edward Quillinan.

The Prelude and Yordas Cave.

In Book VIII of *The Prelude*, Wordsworth describes his experience on entering Yordas Cave in Kingsdale. It is a key passage in the poem addressing the faculties of vision and imagination. In the poem, it is preceded by and compared with, Wordsworth's first visit to London. This entry into the city is a major point in his life, a form of progression: 'The threshold now is

[35] *The Letters of Mary Wordsworth 1800 – 1855* ed. by Mary Burton (Oxford: Clarendon Press, 1958), p. 82.

overpast' (VIII, 700). However, he follows this momentous occasion with 'All that took place within me came and went / As in a moment, and I only now / Remember that it was a thing divine' (VIII, 708 – 10). It is his memory and imagination, his 'unforgetting,' that fills the gap left by his experience. In the drafting of the poem, the Yordas Cave passage was initially written to convey Wordsworth's sense of anti-climax when he first crossed the Alps, described in Book VI (511 – 48). Here Wordsworth's experience of a Yorkshire cave is central to his writing of one of the most important sections of the poem. This crucial importance Is evident in the lines from Book VI that originally followed on from the Yordas passage: 'Imagination! – lifting up itself / Before the eye and progress of my song / Like an unfathered vapour' (VI, 525 – 27). As with his memory of London, his imagination and memory rise from 'below.' It is an example of appearances as perceptive glimpses of the unseen, or of the forgotten. In his guidebook to the caves, Hutton uses Milton's line from *Paradise Lost*, 'darkness visible' to convey the privation of light in the candle-lit gloom of Yordas. For Wordsworth, in such darkness, the eye struggles to define coherent shapes or objects:

> He looks and sees the Cavern spread and grow,
>
> Widening itself on all sides, sees, or thinks
>
> He sees, erelong, the roof above his head,
>
> Which instantly unsettles and recedes
>
> Substance and shadow, light and darkness, all
>
> Commingled, making up a Canopy
>
> Of Shapes and Forms and Tendencies to Shape,
>
> That shift and vanish, change and interchange
>
> Like Spectres, ferment quiet and sublime,

Which, after a short space, works less and less,

Till every effort, every motion gone,

The scene before him lies in perfect view,

Exposed and lifeless, as a written book. (VIII, 715 – 27)

Unlike the cavern at Hardraw, which was illuminated by sunlight, Yordas provides Wordsworth with a large cavern space in total darkness viewed only by a small number of candles. As with the Hardraw cave, the experience is about seeing and imagining a dynamic assemblage of natural features and processes. Wordsworth's traveller 'sees, or thinks / He sees' the boundaries of the cave; he struggles to delineate 'substance and shadow' as appearances, once glimpsed, recede into recesses and darkness; shapes are glimpsed and then change shape as the image of the whole scene is unsettled. The traveller will eventually grasp a fixed view of the material object he has struggled to see in the dim light, though Wordsworth suggests the mind, the imagination, will instigate a further transformation:

But let him pause awhile, and look again

And a new quickening shall succeed, at first

Beginning timidly, then creeping fast

Through all which he beholds; the senseless mass,

In its projections, wrinkles, cavities,

Through all its surface, with all colours streaming,

Like a magician's airy pageant, parts,

Unites, embodying everywhere some pressure

Or image, recognised or new, some type

> Of picture of the world; forests and lakes,
>
> Ships, rivers, towers, the Warrior clad in Mail,
>
> The prancing Steed, the Pilgrim with his Staff,
>
> The mitred Bishop and the throned King,
>
> A Spectacle to which there is no end. (728 – 41)

The material cave, all the rock, water and gravel, is transformed into a cavern of the mind. Its 'senseless mass' of 'projections, wrinkles, cavities,' become whatever the imagination can make of it, once the observer has imagined beyond the superficial, 'through all its surface.' The settled, 'lifeless' image must fall apart before it is re-united in the imagination as something other than what it was. Such a process draws comparisons with Mills' argument about truth and *aletheia* in descent narratives, where disclosure comes through a process of reversal: the descent necessitates forgetfulness whereas the return brings about a remembering.

The cave exists as a prime location for the creation of the imagination. The space and darkness of the cave are crucial along with what shapes and forms are found within. In both Hutton's and Housman's respective guides to the caves, the speleothems that hang from the roof and decorate the walls are described in detail. The descriptions refer to the large flowstone shapes as the 'bishop's throne' and they too are struck by the unsettling visionary experience of flickering candlelight in a cavern so large, 'the eye was busy in amusing itself with the curious reflections which were made by our lights from the streams and petrifactions which appeared all around us' (West, p. 247). The images of 'ships, rivers, towers,' could be sparked from memories of London while the 'Warrior' recalls Wordsworth's vision in 'Black Helvellyn's inmost womb,' in 'The Vale of Esthwaite.'

Duncan Wu and Nicola Trott explore possible sources for Wordsworth's description of Yordas, beyond the experience of his visit there. They suggest that Wordsworth used Housman's *Description and Guide* and, though he too describes the Bishop's Throne, it is probably more likely that he had West's *Guide*.[36] He could have had a copy of Housman's guide as it was published the year he made the trip, 1800. However, the copy in the Rydal Mount library was the second edition of 1802. Of course, he could have used this edition when writing the poem. Wu and Trott also identify Pitt's translation of Virgil's *Aeneid* Book VI as the source of the 'traveller' who is puzzled and bewildered in the darkness. They further identify the influence of William Gilpin's guidebook to the picturesque in Scotland, as he describes the painting by Rubens, 'Daniel in the Lions' Den,' exhibited at Hamilton House. The description is concerned with the use of light entering the cave and how effective it is,

> That painter does the most, who gives the greatest scope to the imagination; and those are the most sublime objects, which are seen in glimpses, as it were – mere coruscations – half viewless forms – and terrific tendencies to shape, which mock investigation.[37]

Gilpin's judgment of Ruben's painting is comparable to Wordsworth's view of Yordas Cave, as is Satan's first view of hell's 'darkness visible' in Milton's *Paradise Lost*. The descent narrative presents characters who descend into the underworld, the land of the dead, and somehow manage to return to that of the living. They return with something they found down below in the depths, something they gained from the dead, something retrieved, recalled, remembered. Wordsworth has referred to these recollections as perceptive 'glimpses' that arise from their 'hiding-places' (XI, 335 – 37). Wordsworth draws these essential aspects of his

[36] Duncan Wu and Nicola Trott, 'Three Sources for Wordsworth's *Prelude* Cave' in *Notes and Queries* September 1991, p. 298.
[37] William Gilpin, *Observations, Relative Chiefly to Picturesque Beauty, Made in the Year 1776, on Several Parts of Great Britain; Particularly the High-Lands of Scotland Vol. II* (London: Blamire, 1789), p. 63.

poetic vision from his experiences in the caves of Yorkshire, an experience that he draws on further in his attempt to define the source of the creative imagination in the poem's 'blind cavern' (XIII, 174).

The Prelude and Weathercote Cave.

In this section, I propose a correspondence between Wordsworth's 'blind cavern' (XIII, 174) and the subterranean river that has at its centre, Weathercote Cave in Chapel-le-dale. A cave well-known to Wordsworth from his travels to Yorkshire. I do not aim to confine and limit the metaphor to a distinct geographical location. My intention is to explore how the unique geographical location of this subterranean river, and the caves and streams that supply it, shaped Wordsworth's creation for this most important foundational metaphor for the creative imagination in *The Prelude*.

John Hutton described Weathercote Cave as 'the most surprising natural curiosity of the kind in the island of Great Britain.' It is 'a stupendous subterranean cataract in a huge cave,' the 'eyes and ears are equally astonished with the sublime and terrible' (West, p. 253). He was not the only one to see it this way; travellers who followed his guide were also struck by its extraordinary nature. Housman offers an amalgam of Hutton's assessment: 'one of the most singular and surprising cataracts in the island of Great Britain.'[38] Sarah Murray in her guide urges her readers to visit: 'Upon no account miss the sight of Weathercote Cave. […] In this cave, which is deep, is a surprising grand waterfall, the effect of it is astonishing to those who have the courage to get at it; but it cannot be described to be perfectly understood.'[39] She too seems to have read Hutton first. Despite the similarity in their descriptions, the effect

[38] John Housman, *A Descriptive Tour and Guide to the lakes, Caves, Mountains and other Natural Curiosities in Cumberland, Westmoreland, Lancashire, and part of the West Riding of Yorkshire* (Carlisle: Jollie, 1802), p. 40.
[39] Sarah Murray, *A Companion and Useful Guide to the Beauties of Scotland, to the Lakes of Westmoreland, Cumberland and Lancashire; and to the Curiosities in the District of Crave, in Yorkshire* (London: George Nicol, 1799), p. 28.

would have been the same, Weathercote Cave was one of Yorkshire's main tourist attractions of the late eighteenth and early nineteenth century. The usual itinerary for those visiting the caves, following both Hutton and Housman, was to start in Ingleton, visit Thornton Force on the way to Yordas Cave in Kingsdale, traverse round Scales Moor and into Chapel-le-dale and visit the system of caves hydrologically associated with Weathercote.

It is not known whether Wordsworth visited Weathercote Cave before he wrote *The Prelude* in 1805, though it is highly likely. As the guidebook evidence suggests, it would be an essential part of any tour to the caves, however brief. In his own *Guide to the Lakes* written in 1810, Wordsworth urges travellers to the Lake District to visit Weathercote on the way, describing it bluntly as a 'fine object.' In 1819, Wordsworth published a sonnet on Weathercote Cave as part of a trilogy of sonnets; the other two address Malham Cove and Gordale Scar, suggested by William Westall's *Views of the Caves near Ingleton, Gordale Scar and Malham Cove in Yorkshire* (Westall thought Weathercote was 'extraordinary'):[40]

> Pure element of waters! wheresoe'er
>
> Thou dost forsake thy subterranean haunts,
>
> Green herbs, bright flowers, and berry-bearing plants,
>
> Rise into life and in thy train appear:
>
> And through the sunny portion of the year,
>
> Swift insects shine, thy hovering pursuivants:
>
> And, if thy bounty fail, the forest pants;
>
> And hart and hind and hunter with his spear

[40] William Westall, *Views of the Caves near Ingleton, Gordale Scar and Malham Cove in Yorkshire* (London: John Murray, 1818), p. 5.

Languish and droop together. Nor unfelt

In man's perturbed soul thy sway benign;

And, haply, far within the marble belt

Of central earth, where tortured Spirits pine

For grace and goodness lost, thy murmurs melt

Their anguish, - and they blend sweet songs with thine.

Up to a point, this sonnet appears as an archaic revival, more like the poems of William Cockin than those of *Lyrical Ballads*. The poem begins with an invocation to the muse, includes ostentatiously poetic vocabulary, such as 'pursuivants,' an anachronistic reference to hunters and spears, and classically conventional 'tortured Spirits' in the underworld, all seemingly what the younger Wordsworth was keen to avoid. The one point, however, that reminds us of the Wordsworth who wrote *The Prelude* and who transformed Yorkshire caves into caverns of the mind, is the focus on the subterranean stream, invoked as the muse, that fills and flows through a vast labyrinthine network of caves beneath the valley floor, and that surfaces in several striking potholes, where life suddenly thrives and where 'appearances are glimpses of the unseen.' The waters of the cave momentarily 'forsake' their 'subterranean haunts' and 'rise into life.' These are the perceptive visions of what has arisen from the imagination. This later description of Weathercote matches the earlier, anonymous cave, the 'blind cavern' of Book XIII of *The Prelude*.

In Book XIII, Wordsworth uses this subterranean metaphor of the 'blind cavern' for source of the creative imagination, which, in the context of this study, is hugely significant. The original source for the subterranean metaphor is Weathercote Cave. Wordsworth establishes the cave as the metaphor for the source of the creative imagination, and, more speculatively, the cave that inspired him to do so was Weathercote.

The relevance of a real location for such a significant metaphor is the time in which this space was being used and studied. Weathercote Cave, as has been argued, was at the centre of the transformation of cave and karst science. Oliver Goldsmith referred to its unique hydrological nature in his early encyclopaedic natural history. Adam Walker was one of the first people to apply Joseph Black's laboratory research into acidic water and carbon to real caves in the field, one of which was Weathercote. Hutton and Housman not only based their tours round Weathercote but also their scientific speculations and topographical descriptions, and Charles Lyell would later refer to Weathercote as the main example for the acidic corrosion of limestone, as would Adam Sedgwick in the geological letters attached to Wordsworth's 1846 edition of his *Guide to the Lakes*. Therefore, my identification of Weathercote Cave as the metaphoric source of Wordsworth's creative imagination is highly significant as it places one of the most important metaphors of romantic poetry at the heart of the most important field of cave and karst science.

In the passage from Book XIII of *The Prelude* that addresses intellectual love, Wordsworth argues that it cannot exist without imagination, a faculty that he identifies as 'absolute strength / And clearest insight, amplitude of mind, / And reason in her most exalted mood' (XIII, 168 – 70). Such a definition matches the depth of observation called for from the natural philosophers observing the forms and processes of the landscape. It is the engaged, thorough and sustained way of seeing that differs from the curious and casual. This mental faculty of the imagination remains the essential foundation of Wordsworth's purpose in *The Prelude*,

> This faculty hath been the moving soul
>
> Of our long labour: we have traced the stream
>
> From darkness, and the very place of birth

> In its blind cavern, whence is faintly heard
>
> The sound of waters; followed it to light
>
> And open day, accompanied its course
>
> Among the ways of Nature, afterwards
>
> Lost sight of it bewildered and engulphed,
>
> Then given it greeting, as it rose once more
>
> With strength, reflecting in its solemn breast
>
> The works of man and face of human life. (171 – 181)

Wordsworth's 'faculty,' or the imaginative power inherent within the poet, and 'the moving soul / Of our long labour,' or, as the subtitle to the 1850 version of the poem suggests, 'the growth of the poet's mind,' are transformed into the metaphor of a subterranean stream. The verbs 'trace,' 'follow,' 'accompany' and 'greeting' as the stream rises in daylight imply a search and journey. Though the 'blind cavern' is a metaphor of origins, the passage in which it is discovered suggests a descent narrative. The phrase that has recurred in cave writing throughout the century and that has found a form in Wordsworth's own writing, 'the hidden recesses of nature,' is alluded to as the stream sinks and flows from sight, into the unimaginably vast extent of the cave. The adjective, 'bewildered,' or made wild is apt for this force that lies beyond conscious control, as is the adjective 'engulphed,' which implies a helpless descent. The stream rises finally into light and, metaphorically, into consciousness and perception.

Travellers who visited the Weathercote Cave system were visiting one of the most remarkable cave systems in the country, and would have known that Winterscales Beck, the stream at the head of the dry valley, emerged out of Gatekirk Cave, a short and easy walk from

Weathercote. This cave was part of the tour that Hutton established and that Housman sustained. This was one of the sources for the water in the system. Another branch of the stream rises high on the slopes of Whernside, at Greenside Cave (Greensett Cave), also part of Hutton's and Housman's tours, though none of the travellers who used Hutton's guide mention visiting this distant and remote cave in their journals. For the traveller to Weathercote, Gatekirk Cave could be perceived as the source, 'the blind cavern.' The substantial stream flows through a wooded valley, 'among the ways of Nature,' and sinks among boulders in the large doline of Haws Gill Wheel, where it is 'lost sight of.' The stream here becomes subterranean and emerges once more as the waterfall in Weathercote, where it is lost sight of again, 'bewildered and engulphed.' The subterranean stream can be glimpsed at the foot of Jingle Pot, seen at the foot of Hurtle Pot, and then resurges 'with strength' at God's Bridge, a short distance from St Leonard's Chapel At this stage in its development it is now transformed into the River Greta. Wordsworth's choice of 'bewildered' suits the development of the descent narrative from *The Vale of Esthwaite* and *Peter Bell*, as Samuel Johnson's dictionary definition offers, 'to lose in pathless places, to confound for want of a plain road.' The subterranean way is lost, and as with descent narratives a guide of some form is required to progress any further. The open potholes provide glimpses of the water before it is 'engulphed' underground.

During this period, Weathercote Cave attracted scientists, painters, poets and tourists in large numbers. The system of flooded passages was partially understood; it was even known that the water sinking on the high slopes of Ingleborough, at Meregill, Hardrawkin and Great Douk, also joined the system of Weathercote, Jingle and Hurtle. However, the extent of this cave system remained unknown; it was, to use Coleridge's phrase from 'Kubla Khan,' a cavern 'measureless to man,' or Shelley's equally impressive line, 'the deep air's unmeasured

wilderness.'[41] Hutton had written in his guide that 'the whole limestone base of this monster of nature is perforated and excavated in all directions like a honeycomb' (Hutton, p. 35). With the 'blind cavern' acting as a metaphor for Wordsworth's imagination it is an apt and effective one: much of our consciousness is known and is evident 'among the ways of Nature,' though where it originates from is unknown, certainly out of sight. What adds to the power of this metaphor is the observation Walker, Hutton and Housman make about the system in flood. The usually dry valley above is flooded and the three great potholes fill and overflow their brims. The subterranean path remains out of sight but much emerges into the light above. It is a remarkable metaphor that renews and reinvigorates the classical underworld metaphor into a contemporary geological one.

A possible literary source of the 'blind cavern' is found in Milton's *Paradise Lost* in the opening passage of Book III. Here Milton compares his blind fate with ancient poets and prophets: Thamyris, Homer, Tiresias and Phineus. All of whom, as Virgil and Dante write, are in Hades. Milton has been taught how to embark on an imaginary descent narrative by Urania, his heavenly muse, 'to venture down / The dark descent, and up to reascend, / Though hard and rare.' (III, 19 – 21) Nicola Trott has argued that Milton's invocation to celestial light to 'shine inward' so that he may 'see and tell / Of things invisible to mortal sight' (III, 52 – 55), is comparable to Wordsworth's multiple names and connotations of inner light throughout his poetry.[42] Such flashes and glimpses are what he sees of the stream emerging occasionally from the darkness of the cavern into the light of day, as moments of perception rising from the imagination.

[41] Percy Shelley, 'Prometheus Unbound' (IV, 336), in *Shelley's Poetry and Prose* ed. by Donald Reiman and Neil Fraistat (New York: Norton, 2002), p. 279.
[42] Nicola Zoe Trott, 'Wordsworth, Milton and the inward light' in *Milton, the Metaphysicals, and Romanticism* ed. by Lisa Lowe and Anthony Harding (Cambridge: Cambridge University Press, 1994), pp. 114 – 135.

Conclusion.

Wordsworth's 'caverns of the mind' and the 'blind cavern' are metaphors for the imagination as a descent into an underworld to retrieve, or 'unforget', moments from the subconscious, or they are metaphors for the place of birth, or origin, of the imagination. Images, memories emerge from below without a descent being necessary. From the classical perspective, it appears to be the case of either Virgil's Aeneas making the descent or of Alecto bursting up from below. Either way it is the cave being imagined as a dislocating and disturbing space though of crucial importance to the poet, as Wordsworth suggests in *Home at Grasmere*, where he has 'Bounds to be leapt and darkness to explore' (948).[43]

Wordsworth demonstrated the attraction of caves through his metaphors and imagery of the underworld, which need not be bound to any material or outward reality of the underground. However, Wordsworth's interest in caves and his experience and knowledge of cave and karst hydrology, along with his friendship with both Sedgwick and Davy, helped shape his metaphors for the origin, or search for, the creative imagination: the stream that emerges from the hidden recess of the 'blind cavern.' This exploration of what appears to exist in a latent form beneath consciousness is also a shaping of the nascent concept of the subconscious. As with the 'glimpses' his imagination generates, Wordsworth's underground is vast and out of sight. Yordas and Weathercote are merely local manifestations of something unimaginable in scale, a labyrinthine space below, without known dimensions and capable of generating the creative imagination.

[43] William Wordsworth, *William Wordsworth: 21st Century Oxford Authors* ed. by Stephen Gill (Oxford: Oxford University Press, 2012), p. 211.

Conclusion

Marjorie Hope Nicolson asserts that the long eighteenth century saw 'one of the most profound revolutions in thought that had ever occurred' through the transformation in the aesthetic perception of the earth and nature.[1] Sharon Ruston argued that natural philosophers at the turn of the eighteenth century witnessed a second scientific revolution as their generic and inclusive view of the natural world divided into specialised fields of science.[2] The essential sites and phenomena that helped enable these two revolutions are limestone caves and the way that writers of poetry, fiction, travel, medicine and natural philosophy changed perceptions of them. This thesis has uncovered a wide range of writing about caves and the imagined underworld and through this writing has established the importance of caves in British culture during this period of momentous change.

Natural philosophers contemplating the origin of limestone caves never doubted the action of water in the process of their formation, what needed to be understood was how the water achieved this remarkable phenomenon. The transformation in knowledge is framed by Shaw's observation that change was not possible until the chemical process of limestone solution was understood.[3] The discovery of how this natural phenomenon, this extraordinary feature of mountains and remote regions, was achieved came through laboratory experiments of chemists, such as Joseph Black. It was achieved both by the mobilisation of knowledge and information through publishing and lecturing, and by the intense and focused localised work of individuals. The discovery of carbonic acid and limestone solution did not only form an understanding of cave morphology, it was the tentative understanding of

[1] Marjorie Hope Nicolson, *Mountain Gloom and Mountain Glory. The Development of the Aesthetic of the Infinite* (Seattle: University of Washington Press, 1997), p. 3.
[2] Sharon Ruston, Creating Romanticism: Case Studies in the Literature, science and Medicine of the 1790s (Basingstoke: Palgrave Macmillan, 2013), p. 2.
[3] Trevor Shaw, *History of Cave Science: The Exploration and Study of Limestone Caves to 1900* (Sydney: Sydney Speleological Society, 1979; repr. 1992), p. 153.

limestone solution and the corrosive processes of carbonic acid to limestone rocks that partially formed the basis for James Hutton's theory of the gradual and repetitive erosion, transport and deposition of rocks over an incomprehensible period of geological time. The discovery highlighted the different rocks and their attendant processes, and, for fieldworkers, their crucially different localities.

Limestone, and the caves that exist within it, outcrops in distinct regions of the country. The rise in popularity of domestic travel and tourism led to these regions being opened up by improved roads, transport and accommodation. Essential to this transformation of countryside utility and people's aesthetic perspective of nature was the guidebook and travel journal. It was in the guidebook that local knowledge was mobilised for a wider readership with the initial cave guidebook to the West Riding of Yorkshire, researched and written by local man, John Hutton, being a prime example. Guides, journals and maps identified an increasing number of caves for travellers and tourists to visit and established difference in cave forms, content and aesthetic character. Caves were described as horizontal or vertical, accessible wholly or in part, extensive or restricted, dry or filled with water, in total darkness or illuminated by glimmers of surface sunlight; they were variable, strange and original and always sublime. Caves are unique environments. Entering a cave is not the same as walking into a wood, or along a river, or even up a mountain, it demands a different aesthetic response. In the enclosed darkness of a cave the visitor sees and feels differently. The sublime perspective is not one of observed detachment but of embodied experience. The guidebooks and journals conveying this experience raised people's consciousness about the infinite variety of cave forms and the bewildering dimensions of the unknown.

The morphological understanding and identification of caves across Britain and Ireland in the long eighteenth century are inextricably bound with aesthetic and literary representations of the subterranean environment, both real and imagined. As Herringman,

O'Connor, Buckland and Ruston argue, literature in the eighteenth century was a more inclusive concept. Drawing on classical and biblical myth, poets and novelists utilised the descent narrative and the revelatory search motif to explore the cave both as a metaphor and as a natural phenomenon. It was an essential location of the sublime experience, according to Edmund Burke, with its qualities of darkness, isolation and privation, as well as the more geological qualities of time and space. It generated fears and excitement of being lost in darkness with the constant threat and added fear of falling, and the fear of being buried alive. Entering a cave is, put simply, like entering another world. Its nature exposes the visitor to an unsettling proximity to the earthly unknown. As a form of inner space, the cave can be imagined in parallel with the perceived magnitude of outer space. Writers exploited this sense of earthly displacement and created a sub-genre of the descent narrative, up-dated from classical myth to accommodate nascent ideas of the subconscious and the workings of the imagination. Though Hades continued to appear in descent narratives, increasingly the underworld became the recognisable underground of natural philosophers and travellers, for example, Richardson's villainous character in *Clarissa*, Lovelace, does not fall into Hades during his nightmare but into Derbyshire's Eldon Hole; Amory's character, John Buncle, devotes much of his time as a natural philosopher and man of action exploring caves in the West Riding of Yorkshire, with footnotes to descents of Penpark Hole and Pool's Cavern; Wordsworth's source of the creative imagination is the remarkable subterranean river visible at Weathercote Cave in Yorkshire. Likewise, the natural philosophers and chemists used the descent narrative or search motif to frame their accounts of experiments and fieldwork, for example, Playfair's identification of the stratigraphic unconformity at the entrance to White Scar Cave while peering into the darkness and imagining the hidden recesses deep below the mountain of Ingleborough, and Hales' name for the trace of the then unidentified carbon dioxide, 'elusive Proteus,' the mutable god. These texts, and the others discovered from this

period, show how both fiction and natural philosophy combine through landscape aesthetics and the descent narrative.

As Adelene Buckland argues, natural philosophers and geologists needed imagination to recreate past worlds that cannot be observed and that the stylistic conventions of literature shaped an understanding of them.[4] The spaces of limestone caves are traces of these former worlds, presenting not only past processes but also paths and passages down through geological time. Caves are gaps in solid rock; they are the tangible elements of rock, water and air yet they are also creations of the imagination. Here are the dimensions of the earth yet to be known, seemingly inexhaustible. The underground was both the site and subject of the scientific and aesthetic revolutions of the long eighteenth century.

[4] Adelene Buckland, Novel science: Fiction and the Invention of Nineteenth Century Geology (Chicago: University of Chicao Press, 2013), p. 14.

Bibliography

Primary Texts

A Poetical Epistle from Admiral Byng, in the Infernal Shades to his Friend L-d A--, an Inhabitant on Earth (London: Fuller, 1757) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW107658161&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Addison, Joseph, *Remarks on Several Parts of Italy, etc. in the Years 1701, 1702, 1703*. (London: Jacob Tonson, 1705) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW100393282&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Addison, Joseph, *The Works of Joseph Addison* 6 vols. Ed. by Henry Bohn (London: Bell, 1903).

Admiral Byng in the Elysian Shades. A Poem (London: Withy and Ryall, 1757) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CB126092322&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Agricola, Georgio, *De Re Metallica,* trans. H. Hoover (London: The Mining Magazine, 1912; repr. Forgotten Books, 2012)

Aikin, John, *An Essay on the Application of Natural History to Poetry* (Warrington: Eyres, 1777; repr. Gale ECCO Print Edition, 2015)

Aiken, John, *A Description of the Country from Thirty to Forty Miles round Manchester* (London: Stockdale, 1795) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW102286872&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Aikin, John, *A Survey of the Counties of Lancashire, Cheshire, Derbyshire, West Riding of Yorkshire, and the Northern parts of Staffordshire* (London: Stockdale, 1797) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CB130048070&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Akenside, Mark, *The Poetical Works* (Edinburgh: James Nichol, 1857)

Amory, Thomas. *Memoirs of Several Ladies of Great Britain* (London: Noon, 1755) *Eighteenth Century Collections Online* http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW102022289&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE [accessed on 23 June 2018]

Amory, Thomas. *The Life of John Buncle, Esq*. (New York: Garland Publishing, 1975)

Aristotle *The Metaphysics* trans. by Hugh Lawson-Tancred (London: Penguin, 2004)

Ashfield, Andrew, and Bolla, Peter de, eds, *The Sublime: A Reader in British Eighteenth Century Aesthetic Theory* (Cambridge: Cambridge University Press, 1996)

Balderston, R. R. & Balderston, M. *Ingleton: Bygone and Present* (London: Simpkin, Marshall & Co, 1888; repr. British Library Historical Editions, 2013)

Barker, Juliet, ed. *William Wordsworth. A Life in Letters* (London: Penguin,2007)

Barnes, Jonathan, ed. *Early Greek Philosophy*, (London: Penguin, 2001)

Beaumont, J. 'A Letter Giving an Account of Ookey-hole, and Several Other Subterranean Grottoes and Caverns in Mendip-hills in Somersetshire' *Philosophical Collections*, 2 (1681) Google ebook

Behrens, Georg Henning, *The Natural History of the Hartz-Forest, in his Majesty King George's German Dominions* (London: Osborne, 1730; repr. Gale ECCO Print Editions, 2015)

Beowulf ed. by C.L. Wrenn and W. F. Bolton (Exeter: University of Exeter Press, 1988)

Berkeley, George, 'Description of the Cave of Dunmore' in *Works of George Berkeley Vol. IV* ed. by A. Fraser. (Oxford: Clarendon Press, 1901)

Black, Joseph, *Experiments upon Magnesia Alba, Quick-lime and other Alcaline Substances* (Edinburgh: William Creech, 1782) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW108331623&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Boswell, James, *Boswell: The Ominous Years 1774 – 1776* ed. by Charles Ryskamp and Frederick Pottle (London: Heinemann, 1963)

Boswell, James, *Boswell: Laird of Auchinleck 1778 – 1782* ed. by Joseph Reed and Frederick Pottle (New York: McGraw-Hill, 1977)

Bourn, Benjamin, *A Sure Guide to Hell* (London: Peter Imp, 1750) Eighteenth Century Collections Online <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW120407208&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Bowden, Charles, *A Tour through Ireland* (Dublin: Corbet, 1791) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW106537125&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Boyle, Robert, A *Free Enquiry into the Vulgarly Received Notion of Nature* ed. by Edward Davies and Michael Hunter (Cambridge: Cambridge University Press, 1996)

Bray, William, *Sketch of a Tour into Derbyshire and Yorkshire* (London: White, 1783) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=E

CCO&userGroupName=unilanc&tabID=T001&docId=CW103262739&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Brome, James, *Travels over England, Scotland and Wales* (London: Gosling, 1707) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CB129933157&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Brydone, Patrick, *A Tour through Sicily and Malta* (London: Johnson, 1792) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW101025088&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Buckland, William, *Reliquiae Diluvianae, or, Observations on the Organic Remains Contained in Caves, Fissures, and Diluvial Gravel, and on other Geological Phenomena, Attesting the Action of an Universal Deluge* (London: John Murray, 1823; repr. Cambridge Library Collections, 2016)

Burke, Edmund, *A Philosophical Enquiry into the Sublime and the Beautiful*, *and Other Pre-Revolutionary Writings*, ed. by David Womersley (London: Penguin, 1998)

Burnet, Gilbert, *Bishop Burnet's Travels through France, Italy, Germany and Switzerland* (Edinburgh: Sands, Murray and Cochran, 1752) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW100099782&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Burnet, Thomas, *An Answer to the Exceptions made by Mr Erasmus Warren against The Sacred Theory of the Earth* (London: Hooke, 1719) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CB131497348&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Burnet, Thomas, *A Sacred Theory of the Earth* (London: Centaur Press, 1965)

Burton, Mary, ed. *The Letters of Mary Wordsworth 1800 – 1855* (Oxford: Clarendon Press, 1958)

Burton, Robert, *The Anatomy of Melancholy* 3 vols. (London: Bell and Sons, 1927)

Byng's Tours: The Journals of the Hon. John Byng 1781 – 1792 ed. by David Souden (London: Century, 1991)

Carl Moritz, Journeys of a German in England trans. by Reginald Nettel (London: Eland Books, 1965)

Cavendish, Henry, 'Three Papers Containing Experiments on Factitious Air' *Philosophical Transactions* 56 (1766) <http://rstl.royalsocietypublishing.org/content/56/141.full.pdf+html> [accessed 30 April 2018]

Catcott, Alexander, *A Treatise of the Deluge* (London: Allen, 1761; repr. Gale ECCO Print Editions, 2014)

Catcott, G. *A Descriptive Account of a Descent made into Penpark Hole* (Bristol: Rudhall, 1792; repr. Gale ECCO Print Editions, 2014)

Chetwood, William, *A Tour through Ireland. Wherein the Present State of that Kingdom is Considered* (Dublin: Wilson, 1746) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CB129594502&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Cockin, William, *Ode to the Genius of the Lakes in the North of England* (London: Richardson and Urquhart, 1780; repr. Gale ECCO Print Editions, 2017)

Coleridge, Samuel Taylor, *Biographia Literaria* (London: Everyman, 1906)

Coleridge's Poetry and Prose ed. by Nicholas Halmi, Paul Magnuson, Raimonda Modiano (New York: Norton, 2004)

Cooper, A. A. *Characteristics of Men, Manners, Opinions, Times* ed. by L. E. Klein (Cambridge: Cambridge University Press, 1999)

Cotton, Charles, *The Wonders of the Peak* (Nottingham: Thomas Collyer, 1744; repr. Gayle ECCO Print Editions, 2016)

Craighead, George, *The Nature and Place of Hell Discovered* (Edinburgh: Gideon Crawford, 1748) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW120656204&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 201

Dalton, John, *A Descriptive Poem Addressed to Two Ladies, at their Return from Viewing the Mines near Whitehaven* (London: Rivington and Dodsley, 1755; repr. Gale ECCO Print Editions, 2015)

Dante's Inferno trans. by Henry Francis Cary (Chicago: Thompson & Thomas, 1966; repr. Forgotten Books, 2017)

Davy, John, ed. *The Collected Works of Humphry Davy.* 9 vols (London: Smith, Elder and Co., 1839) Google ebook

Defoe, Daniel, *The History of the Devil, Ancient and Modern in Two Parts* (London: Kelly, 1819)

Defoe, Daniel, *A Tour through the Whole Island of Great Britain*, ed. by Pat Rogers (London: Penguin, 1971)

Defoe, Daniel, *Robinson Crusoe,* ed. by Angus Ross (London: Penguin, 1985)

De Quincey, Thomas, *Confessions of an English Opium-Eater, and other Writings* ed. by Barry Milligan (London: Penguin, 2003

'Directions for Sea-Men, Bound for Far Voyages' *Philosophical Transactions,* 1 (1665), pp 140 – 143 <rstl.royalsocietypublishing.org/content/1/8/140.full.pdf+html> [accessed on 23 June 2018]

Dixon, Thomas, *A Description of the Environs of Ingleborough and Principle Places on the Banks of the River Wenning* (Kendal: Ashburner, 1781; repr. Gale ECCO Print Editions, 2014)

Donne, John, 'A nocturnall upon St Lucies day, Being the shortest day' l. 18 in *The Complete English Poems* ed. David Campbell (London, Everyman, 1991)

Dorsch, T., trans. *Classical Literary Criticism: Aristotle, Horace and Longinus* (Penguin, Harmondsworth, 1965)

Durant, J, 'A Letter from Mr. J. Durant to the Honourable Robert Boyle, Esq; F.R.S. concerning a Subterraneous Cavern in Weredale' in *Philosophical Transactions,* 44 (1746), pp. 221 – 223. < rstl.royalsocietypublishing.org/content/44/480/221.full.pdf+html > [accessed on 21 June 2018]

Early Poems and Fragments, 1785 – 1797, by William Wordsworth eds. Carol Landon, Jared Curtis (New York: Cornell University Press, 1997)

Faujas Saint-Fond, Bartholomie, *Travels in England, Scotland and the Hebrides* Vol. II (London: Ridgway, 1799) Google ebooks

Fielding, Henry, *A Journey from this World to the Next* eds. Ian Bell and Andrew Varney (Oxford: Oxford University Press, 1997)

Fuller, John, 'A Description of a Large Lake Called Malholm Tarn, Near Skipton in Craven, in the County of Yorkshire' in *Philosophical Transactions*, 41 (1741), 41, pp. 612 – 614. <rstl.royalsocietypublishing.org/content/41/459/612.full.pdf+html> [accessed on 21 June 2018]

Garnett, Thomas, *Observations on a Tour through The Highlands and Part of the Western Isles of Scotland* (London: Cadell & Davies, 1800) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW107059775&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Geological Inquiries, in C. Lewis and S Knell, eds, *The Making of the Geological Society of London* (London: The Geological Society, 2009), pp. 449 – 456.

Gilpin, William, *Observations, Relative Chiefly to Picturesque Beauty, Made in the Year 1776, on Several Parts of Great Britain; Particularly the High-Lands of Scotland* 2 vols, (London: Blamire, 1789) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW103422368&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Gilpin, William, *Observations on Several Parts of England particularly the Mountains and Lakes of Cumberland and Westmoreland relative chiefly to Picturesque Beauty* 2 vols. (London: Cadell & Davies, 1808)

Glanvil, Joseph, 'Answers to Some of the Inquiries Formerly Published Concerning Mines' *Philosophical Transactions,* 2 (1666) <http://rstl.royalsocietypublishing.org/content/2/28/525.full.pdf+html> [accessed 30 April 2018]

Goldsmith, Oliver, *An History of the Earth and Animated Nature* 8 vols. (London: Nourse, 1779) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW108365153&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Gray, Thomas, 'Mr. Gray's Journal' in Thomas West, *A Guide to the Lakes in Cumberland, Westmorland, and Lancashire* ed. by William Cockin (London: Richardson and Urquhart, 1780)

Gray, Thomas, *A Supplement to the Tour through Great Britain* (London: Keansley, 1787) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW102050193&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Hales, Stephen, *Vegetable Staticks* (London: Innys, 1727) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW107072654&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Hales, Stephen, *An Account of Some Experiments and Observations on Mrs Stephen's Medicines for Dissolving the Stone* (London: Woodward, 1740) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW107213396&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Hall, Rupert, and Hall, Marie Boas, trans. & eds., *The Correspondence of Henry Oldenburg* Vol. XII (London: Taylor and Francis, 1986)

Halley, Edmond, 'An Account of the Circulation of the Watery Vapours of the Sea, and of the Cause of Springs' *Philosophical Transactions,* 17 (1686) <http://rstl.royalsocietypublishing.org/content/17/192/468.full.pdf+html> [accessed 30 April 2018]

Halley, Edmond, 'A Short Account of the Cause of Saltness of the Ocean, and of the Several Lakes that Emit no Rivers; with a Proposal, by Help thereof, to Discover the Age of the World' *Philosophical Transactions* 29 (1714) pp. 296-300. <http://rstl.royalsocietypublishing.org/content/29/344/296.full.pdf+html> [accessed 30 April 2018]

Hartley, David, *Observations on Man, his Frame, his Duty and his Expectations* (London: Johnson, 1801; repr. British Library Historical Editions, 2015)

Heaney, Seamus, *New Selected Poems 1966 – 1987* (London: Faber and Faber, 1990)

Hedinger, J. M., *A Short Description of Castleton in Derbyshire. Its Natural Curiosities and Mineral Productions* (Castleton: Samuel Needham, 1799) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=E

CCO&userGroupName=unilanc&tabID=T001&docId=CW100064926&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Hesiod: Theogony and *Work and Days,* trans. by D. Wender (Penguin: London, 1973)

Hill, Alan, ed. *Letters of William Wordsworth* (Oxford: Oxford University Press, 1984)

Home, Henry, Lord Kames *Elements of Criticism* 2 vols. (New York: Georg Olms Verlag Hildesheim, 1970)

Hooson, William, *The Miners' Dictionary* (Wrexham: Payne, 1747; repr. Gale ECCO Print Editions, 2016)

Housman, John, 'John Housman's Tour of England' in *Monthly Magazine* 1796 – 1799 Google ebooks

Housman, John, *A Topographical Description of Cumberland, Westmoreland, Lancashire, and Part of the West Riding of Yorkshire* (Carlisle: Jollie, 1800) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW102434244&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Housman, John, *A Descriptive Tour, and a Guide to the lakes, caves and Mountains, and other Natural Curiosities, in Cumberland, Westmoreland, Lancashire, and Part of the West Riding of Yorkshire* (Carlisle: Jollie, 1802)

Humboldt, Alexander von, *Views of Nature*, trans. by Mark Person (Chicago: Chicago University Press, 2016)

Hume, David, *A Treatise of Human Nature* ed. by David Norton and Mary Norton (Oxford: Oxford University Press, 2000)

Hume, David, *Dialogues Concerning Natural Religion* ed. by Dorothy Coleman (Cambridge: Cambridge University Press, 2007)

Hurtley, Thomas, *A Concise Account of some Natural Curiosities, in the Environs of Malham, in Craven Yorkshire* (London; Walter, 1786; repr. Gale ECCO Print Editions, 2016)

Hutchinson, John, *Observations Made by JH, mostly in the Year 1706* (London: no publisher, 1710) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CB127010894&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Hutchinson, John, *Moses' Principia* (London: Bettenham, 1724) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW121660859&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Hutchinson, John, *An Essay toward a Natural History of the Bible* (London: Bettenham, 1725) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=E

CCO&userGroupName=unilanc&tabID=T001&docId=CW121962725&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Hutchinson, William, *An Excursion to the Lakes in Westmoreland and Cumberland; with a Tour through Parts of the Northern Counties in the Years 1773 and 1774* (London, 1776) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CB127186322&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Hutton, James, *Abstract of a dissertation read in the Royal Society of Edinburgh, upon the seventh of March and fourth of April 1785, concerning the system of the earth, its duration and stability* (Edinburgh: Creech, 1785; repr. Gale ECCO Print Editions, 2017)

Hutton, James, *Theory of the Earth: Investigation into Laws Observable in the Composition, Dissolution, and Restoration of Land upon the Globe* (Edinburgh: Creech, 1788; repr. Forgotten Books, 2015)

Hutton, James, *Theory of the Earth with Proofs and Illustrations Volume I* (Edinburgh: Cadell, Davies and Creech, 1795) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CB128447197&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Hutton, John, (pseud. 'Pastor') 'A description of Ingleborough, a mountain in Yorkshire' in *Annual Register* 1761 Google ebooks

Hutton, John, *A Tour to the Caves, in the Environs of Ingleborough and Settle* (London: Richardson and Urquhart, 1781; repr. Wakefield: S.R. Publishers, 1970)

Jago, Richard, *Edge-Hill; or, the Rural Prospect Delineated and Moralized. A Poem, in Four Books* (London: Dodsley, 1767; repr. British Library Historical Editions, 2014)

Samuel Johnson, 'The Rambler, 4 vols.' in *Moore's British Classics containing Dr. Johnson's Rambler and Lord Littleton's Persian Letters*, ed. by James Moore (Dublin: Moore, 1793) Google ebook

Johnson, Samuel, & Boswell, James, *A Journey to the Western Islands of Scotland & Journal of a Tour to the Hebrides* (Oxford: Oxford University Press, 1934)

Kant, Immanuel, *Critique of Pure Reason*, trans. by Paul Guyer and Allen Wood (Cambridge: Cambridge University Press, 1998)

Kant, Immanuel, *Critique of the Power of Judgement,* trans. P. Guyer (Cambridge: Cambridge University Press, 2001)

Kant, Immanuel, 'Anthropology from a pragmatic point of view' pp. 231 – 429 in *Anthropology, History and Education* ed. Gunter Zoller and Robert Louden (Cambridge: Cambridge University Press, 2007)

Keill, John, *An Examination of Dr Burnet's Theory of the Earth* (London: Clements and Harding, 1734) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=E

CCO&userGroupName=unilanc&tabID=T001&docId=CW106782284&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Kirwan, Richard, *Elements of Mineralogy* (London: Elmsly, 1784) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW107039487&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Kirwan, Richard, *An Essay on the Analysis of Mineral Waters* (London: Bremer, 1799) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW125030869&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Kirwan, Richard, *Geological Essays* (London: Bremer, 1799) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW124794185&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Leibniz, Gottfried W., *New Essays on Human Understanding* trans. Peter Remnant and Jonathan Bennett (Cambridge: Cambridge University Press, 1996)

Leigh, Charles, *The Natural History of Lancashire, Cheshire and the Peak in Derbyshire* (Oxford: 1700)

Lloyd, John, 'An Account of Elden Hole in Derbyshire' in *Philosophical Transactions,* 61 (1771), pp. 250 – 265. <rstl.royalsocietypublishing.org/content/61/250.full.pdf+html> [accessed on 21 June 2018]

Locke, John, *An Essay on Human Understanding* (London: Tegg, 1838)

Lucas, Charles, 'A Description of the Cave of Kilcorny in the Barony of Burren in Ireland' in *Philosophical Transactions*, 41 (1739), pp. 360 – 364. <rstl.royalsocietypublishing.org/content/41/456/360.full.pdf+html> [accessed on 21 June 2018]

Lyell, Charles, *Principles of Geology* 3 vols. (London: John Murray, 1830)

Macbride, David, *Experimental Essays on Medical and Philosophical Subjects* (Dublin: Ewing, 1767) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW107272054&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

MacRitchie, William, *Diary of a Tour through Britain in 1795* (London: Stock, 1897; repr. British Library Historical Editions, 2015)

Mallet, David, *The Poetical Works* (Edinburgh: Apollo Press, 1780)

Milton, John *Paradise Lost* ed. by Scott Elledge (Norton: New York, 1993)

Morris, R., ed. *The Blickling Homilies* (Oxford: Early English Text Society, University of Oxford Press, 1967)

Murray, Sarah, *A Companion and Useful Guide to the Beauties of Scotland, to the Lakes of Westmorland, Cumberland and Lancashire; and to the Curiosities in the District of Craven in the West Riding of Yorkshire* (London: George Nicol, 1799; repr. Gale ECCO Print Editions, 2016)

Newton, Isaac, *Philosophical Writings* ed. by Andrew Janiak (Cambridge: Cambridge University Press, 2014)

Nicholson, William, *An Introduction to Natural Philosophy* 2 vols. (Philadelphia: Thomas Dobson, 178) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW120651129&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Nicholson, William, *The First Principles of Chemistry* (London: Robinson, 1790) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW107325092&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Oakes, Abraham, *The Doctrine of Hell Torments, Distinctly and Impartially Discussed* (London: Noon, 1740) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW117776664&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Ousby, Ian, ed, *James Plumptre's Britain: The Journals of a Tourist in the 1790s* (London: Hutchinson 1992)

Ovid's Art of Love. In Three Books. Together with his Remedy of Love. Translated into English Verse by Several Eminent Hands (London: Taylor, 1725) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW112238722&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Ovid's Metamorphoses in Fifteen Books. Translated by the Most Eminent Hands (London: Jacob Tonson, 1717) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW115475311&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Pennant, Thomas, *A Tour in Scotland and a Voyage to the Hebrides* (Chester: Monk, 1774; repr. Gale ECCO Print Editions, 2015)

Peter Bell by William Wordsworth ed. by John Jordan (New York: Cornell University Press, 1985)

Pilkington, James, *A View of the Present State of Derbyshire* 2 vols. (Derby: Drewry, 1789) *Eighteenth Century Collections Online*

<http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW103919006&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Playfair, John, *Illustrations of the Huttonian Theory of the Earth* (Edinburgh: Creech, 1802; repr. British Library Historical Editions, 2014)

Pococke, Richard, *The Travels through England of Dr. Richard Pococke Vol. 1* ed. by James Cartwright (London: Camden Society, 1888)

Pope, Alexander, *Poetical Works* ed. by Herbert Davis (London: Oxford University Press, 1966)

Povey, Charles, *The Torments after Death* (London: Roberts, 1742) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW122622450&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

'Preface to the Seventh Year of these Tracts,' *Philosophical Transactions,* 6 (1671**)** 2087-2093 <rstl.royalsocietypublishing.org/content/6/69/2087.full.pdf+html> [accessed 21 June 2001]

Ray, John, *The Wisdom of God, Manifested in the Works of Creation* (London: Smith, 1704) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW121855422&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Ray, John, *Three Physico-Theological Discourses, concerning the Primative Chaos and Creation of the World, the General Deluge, its Causes and Effects, the Dissolution of the World and Future Conflagration* (London: William Innys, 1713) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW119154683&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Richardson, Jonathan, *A Discourse on the Dignity, Certainty, Pleasure and Advantage of the Science of a Connoisseur* (London: Churchill, 1719) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW106308082&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed 23 June 2018]

Richardson, Samuel, *Clarissa, or the History of a Young Lady* ed. by Angus Ross (London: Penguin, 1985)

Rogers, Charles, *The Inferno of Dante* (London: Nichols, 1782) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW114791180&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Ruskin, John, *Selected Writings* ed. Kenneth Clarke (London: Penguin, 1982)

Savage, Richard, *The Wanderer. A Vision: A Poem in Five Cantos* (London: Walthoe, 1729; repr. Gale ECCO Print Editions, 2015)

Scales, John 'Description of Caverns in Yorkshire' in *The Monthly Magazine Vol. 34 1813* Google ebooks

Searle, R. W., 'Map of the West Riding of Yorkshire' in *The Universal Museum and Complete Magazine of Knowledge and Pleasure* (London: John Hinton, 1748-49) Google ebook

Selincourt, Ernest de, ed. *The Letters of William and Dorothy Wordsworth Vol. I. The Early Years 1787 – 1805* (Oxford: Oxford University Press, 1967)

Seward, Anna, 'Colebrook Dale' in *Romantic Women Poets 1770 – 1838* ed. Andrew Ashfield (Manchester: Manchester University Press, 1995)

Schelling, Friedrich, *Ideas for a Philosophy of Nature, as Introduction to the Study of this Science*, trans. by Errol Harris and Peter Heath (Cambridge: Cambridge University Press, 1988)

Seneca, *Phaedra and Other Plays* trans. by R. Scott Smith (London: Penguin, 2011)

Shelley, Mary, *Frankenstein. 1818 Text* ed. Marilyn Butler (Oxford: Oxford University Press, 1998)

Shelley, Percy Byssche, *Essays: Letters from Abroad, Translations and Fragments* 2 vols, ed. by Mary Shelley (London: Edward Moxon, 1840)

Shelley's Poetry and Prose ed. by Donald Reiman & Neil Fraistat (New York: Norton, 2002)

Shelley, Percy Byssche, *A Defence of Poetry, and other Essays,* ed. by J. M. Beach. (Austin: West by Southwest Press, 2012)

Siegreid, Robert and Dott, Robert, eds, *Humphry Davy on Geology. The 1805 Lectures for the General Audience* (Wisconsin: University of Wisconsin Press, 1980)

Simpson, Samuel, *The Agreeable Historian, or the Compleat English Traveller* 2 vols. (London: Walker, 1746) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW103070049&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Skrine, Henry, *Three Successive Tours in the North of England and Great Part of Scotland* (London: Bulmer, 1795) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW103190245&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Smith, William, *A Memoir to the Map and Delineation of the Strata of England and Wales, with part of Scotland* (London: John Cary, 1815)

Smith, William, *A Delineation of the Strata of England and Wales with Part of Scotland; Exhibiting the Collieries and Mines, the Marshes and Fen Lands Originally Overflowed by the Sea, and the Varieties of Soil According to the Variations in the Substrata.* (Facsimile printed by the British Geological Survey, 2015)

Sneyd, Ralph, *A Letter to Dr. Toulmin, MD.* (London: Lee and Rivington, 1783; repr. Gale ECCO Print Editions, 2015)

Southwel, Robert, 'A Description of Pen-Park-Hole in Gloucestershire' *Philosophical Transactions* 13 (1683) <http://rstl.royalsocietypublishing.org/content/13/143/2.2.full.pdf+html> [accessed 30 April 2018]

Spinoza, Baruch, *Ethics* trans. by Edwin Curley (London: Penguin, 1996)

Spinoza, Baruch, *Theological-Political Treatise* trans. by Jonathan Israel (Cambridge: Cambridge University Press, 2007)

Smollett, Tobias, *The Expedition of Humphry Clinker* ed. by Shaun Regan (London: Penguin, 2008)

Southey, Robert, *Poems 1799* (Poole: Woodstock Books, 1997)

Stephens, Joanna, *A Most Excellent Cure for the Stone and Gravel* (London: [n. pub.], 1740) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW108191291&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Sulivan, Richard, *Observations Made during a Tour through Parts of England, Scotland, and Wales in a Series of Letters* (London: Becket, 1780; repr. Gale ECCO Print Editions 2015)

Swinden, Tobias, *An Enquiry into the Nature and Place of Hell* (London: 1727; repr. Gale ECCO Print Editions, 2016)

Taylor, Thomas, *The Eleusinian and Bacchic Mysteries: A Dissertation* (New York: Bouton, 1891)

'The Apocalypse of Paul (Visio Pauli)' in *The Apocryphal New Testament: A Collection of Apocryphal Christian Literature in an English Translation* trans. by J. K. Elliott (Oxford: Oxford University Press, 1993), pp. 616 – 644.

The Bible: Authorized King James Version ed. by Robert Carroll and Stephen Prickett (Oxford: Oxford University Press, 1997)

The Blasted Laurel. A Poem (London: Baldwin, 1702) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CB130637508&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

The Letters of Mary Wordsworth 1800 – 1855 ed. Mary Burton (Oxford: Clarendon Press, 1958)

The Letters of William and Dorothy Wordsworth Vol. I The Early Years 1787 – 1805 ed. Ernest de Selincourt (Oxford: Oxford University Press, 1967)

'The Preface,' *Philosophical Transactions of the Royal Society*, 11 (1676) <http://rstl.royalsocietypublishing.org/content/11/123/551.full.pdf+html> [accessed 30 April 2018]

The Republic of Plato in Ten Books, trans. H. Spens (Glasgow: Foulis, 1763) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW122414057&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

The Works of Virgil, in Latin and English. The Aeneid, Volume III trans. Christopher Pitt (London: Dodsley, 1753; repr. Gale ECCO Print Editions, 2016)

'Three Original Sonnets of Wordsworth: Suggested by Westall's Views of the Caves in Yorkshire' in *Blackwood's Edinburgh Magazine Vol. IV 1818-1819* Google ebooks

Thomson, William, *A Tour in England and Scotland, in 1785. By an English Gentleman* (London: Robinson, 1788) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW102968355&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Thomson, James, *The Complete Poetical Works* ed. J. Logie Robertson (Oxford: Oxford University Press, 1908)

Titus Lucretius Carus: Of the Nature of Things, trans. Thomas Creech (London: J. Matthews, 1714) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CB131743241&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Toulmin, G. *The Antiquity and Duration of the World* (London: Caddell, 1780; repr. Gale ECCO Print Editions, 2015)

Troil, Uno von, *Letters on Iceland* (London: Robson, 1780) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW100957322&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Valvasor, Johann Weichard, 'An Extract of a Letter written to the Royal Society out of Carnolia, being a full and accurate description of the wonderful Lake of Zirknitz in that Country' in *Philosophical Transactions* 16 (1686) <http://rstl.royalsocietypublishing.org/content/16/191/411.full.pdf+html> [accessed 30 April 2018]

Virgil's Aeneid trans. John Dryden (London: Penguin, 1997)

Virgil: The Aeneid trans. Robert Fagles (London: Penguin, 2007)

Walker, Adam, 'A Letter to Charles Morton, MD. Secretary of the Royal society; containing an account of the Cavern of Dunmore park, near Kilkenny, in Ireland' *Philosophical Transactions* 63 (1773) <http://rstl.royalsocietypublishing.org/content/63/16.full.pdf+html> [accessed 30 April 2018]

Walker, Adam, 'A Description of Dunald Mill Hole' in Thomas West, *A Guide to the Lakes in Cumberland, Westmorland, and Lancashire* ed. William Cockin (London: Richardson and Urquhart, 1780)

Walker, Adam, 'A description of some natural curiosities in the western edge of Yorkshire,' in Thomas West, *A Guide to the Lakes, in Cumberland, Westmoreland and Lancashire* (London: Richardson and Urquhart, 1780)

Walker, Adam, *A System of Familiar Philosophy in Twelve Lectures* (London: Kearsley, 1799) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW120248266&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Warburton, Joseph, 'A dissertation on the sixth book of Virgil's Aeneis' in Pitt, C. *The Works of Virgil in Latin and English* Volume III (London: Dodsley, 1753; repr. Gale ECCO Print Edition, 2016)

Watson, Richard, *An Apology for Christianity, in a Series of Letters Addressed to Edward Gibbon, Esq.* (London 1791) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW120863045&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Welsted, Leonard, *Epistles, Odes, etc. Written on Several Subjects with a Translation of Longinus's Treatise on the Sublime* (London: Walthoe, 1724) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW110271579&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

West, Thomas, *A Guide to the Lakes, in Cumberland, Westmorland, and Lancashire* (London: W. Pennington, 1780)

Westall, William, *Views of the Caves near Ingleton, Gordale Scar, and Malham Cove in Yorkshire* (London: John Murray, 1818; repr. British Cave Research Association, 2000)

Whiston, William, *A New Theory of the Earth* (New York: Arno Press, 1978)

Whitehurst, John, *An Inquiry into the Original State and Formation of the Earth* (London: Cooper 1778; repr. Gale ECCO Print Editions, 2014)

Whytt, Robert, *An Essay on the Virtues of Lime-Water in the Cure of the Stone* (Dublin: Watts, 1762) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW107625638&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Woodward, John, *An Essay towards a Natural History of the Earth* (London: Bettesworth and Taylor, 1723) *Eighteenth Century Collections* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW107830775&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Woodward, John, *Fossils of all Kinds, Digested into a Method Suitable to their Mutual Relation and Affinity* (London: Innys, 1728) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW109380948&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Winslow, J.B. *The Uncertainty of the Signs of Death, and the Danger of Precipitate Interments and Dissections Demonstrated* (London: Cooper, 1746) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CW108852991&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Wordsworth, Dorothy, *The Grasmere and Alfoxden Journals* ed. by Pamela Woof (Oxford: Oxford University Press, 2002)

Wordsworth, William, *A Complete Guide to the Lakes* (London: Longman and Co. 1842)

Wordsworth, William, *The Poetical Works,* ed. by Thomas Hutchinson (Oxford: Oxford University Press, 1923)

Wordsworth, William, *The Prelude. The 1805 Text,* ed. by Edward de Selincourt (Oxford: Oxford University Press, 1970)

Wordsworth, William, *The Prelude: 1799, 1805, 1850*, ed. by Jonathan Wordsworth, M.H. Abrams and Stephen Gill (New York: Norton, 1979)

Wordsworth, William, *The Major Works,* ed. by Stephen Gill (Oxford: Oxford University Press, 2000)

Wordsworth, William, *A Description of the Lakes* (Otley: Woodstock Facsimile, 2002)

Wordsworth, William, *Guide to the Lakes* (London: Frances Lincoln, 2004)

William Wordsworth, *William Wordsworth. 21st-Century Authors* ed. by Stephen Gill (Oxford: Oxford University Press, 2014)

Yalden, Thomas, *A Poem on the Mines, late of Cranberry Price* (London: Nutt, 1701) *Eighteenth Century Collections Online* <http://find.galegroup.com.ezproxy.lancs.ac.uk/ecco/infomark.do?&source=gale&prodId=ECCO&userGroupName=unilanc&tabID=T001&docId=CB131068942&type=multipage&contentSet=ECCOArticles&version=1.0&docLevel=FASCIMILE> [accessed on 23 June 2018]

Young, Edward, *Night Thoughts,* ed. Stephen Cornford (Cambridge: Cambridge University Press, 1989)

Secondary Texts

Abrams, M. H., *Natural Supernaturalism: Tradition and Revolution in Romantic Literature* (New York: Norton, 1973)

Adorno, Theodor, and Horkheimer, Max, *Dialectic of Enlightenment* (London: Verso, 1997)

Allen, John Logan, 'Lands of Myth, Waters of Wonder: The Place of the Imagination in the History of Geographical Exploration' in *Geographies of the Mind: Essays in Historical Geosophy* eds. Lowenthal, D. and Bowden, M. (New York: Oxford University Press, 1976)

Anglezarke, D., 'Poisoned Places: the Avernian tradition in Old English poetry' in *Anglo-Saxon England* 36, 2007.

Atkinson, Dwight, *Scientific Discourse in Socio-historical Contexts* (New Jersey: Lawrence Erlbaum Assoc., 1999)

Bachelard, Gaston, *Air and Dreams: An Essay on the Imagination of Movement* trans. Edith Farrell and Frederick Farrell (Dallas: Dallas Institute of Humanities and Culture, 1988)

Bachelard, Gaston, *The Poetics of Space,* trans. by M. Jolas. (Boston: Beacon 1994)

Bachelard, Gaston, *Earth and Reveries of Will: An Essay on the Imagination of Matter* trans. by Kenneth Haltman (Dallas: Dallas Institute Publications, 2002)

Barrell, John, *The Idea of the Landscape and the Sense of Place 1730 – 1840* (Cambridge: Cambridge University Press, 1972)

Bate, Jonathan, *Romantic Ecology: Wordsworth and the Environmental Tradition* (London: Routledge, 1991)

Bate, Jonathan, *The Song of the Earth* (London: Picador, 2000)

Battersby, Christine, *The Sublime, Terror and Human Difference* (London: Routledge, 2007)

Baxter, Stephen, *Revolutions in the Earth: James Hutton and the True Age of the World* (London: Phoenix, 2004)

Berleant, Arnold. 'The Aesthetics of Art and Nature' in Carlson, A & Berleant, A. (eds) *The Aesthetics of the Natural Environment* New York, Broadview Press, 2004 pp. 76 – 88.

Blades, M. and Kitchin, R. *The Cognition of Geographic Space* (Tauris: London, 2002)

Brady, Emily, *Aesthetics of the Natural Environment* (Edinburgh: Edinburgh University Press, 2003)

Bodkin, Maud, *Archetypal Patterns in Poetry: Psychological Studies of Imagination* (London: Oxford University Press, 1934)

Buckland, Adelene, *Novel Science: Fiction and the Invention of Nineteenth Century Geology* (Chicago: University of Chicago Press, 2013)

Burkes, David Clarke, ed. *Place of the Wild* (Washington DC: Island Press, 1994)

Camporesi, Piero, *The Fear of Hell: Images of Damnation and Salvation in Early Modern Europe* trans. by Lucinda Byatt (Cambridge: Polity Press, 1990)

Carlson, A. 'Appreciation and the Natural Environment' in Carlson, A & Berleant, A. (eds) *The Aesthetics of the Natural Environment* New York, Broadview Press, 2004 pp. 63 – 75.

Casey, Edward S., *The Fate of Place: A Philosophical History* (Berkeley: University of California Press, 1998)

Casey, Edward S., *Representing Place: Landscape Painting and Maps* (Minneapolis: University of Minnesota Press, 2002)

Casey, Edward S., *Getting Back into Place: Toward a Renewed Understanding of the Place-World* (Bloomington: Indiana University Press, 2009)

Castree, Noel, *Making Sense of Nature* (London: Routledge, 2014)

Clark, Raymond, *Catabasis: Vergil and the Wisdom Tradition* (Amsterdam: B. R. Gurner, 1979)

Clarke, T. *Literature and the Environment* (Cambridge: University Press, 2011)

Coates, Peter, *Nature: Western Attitudes since Ancient Times* (Cambridge: Polity Press, 1998)

Coe, Angela, ed., *The Sedimentary Record of Sea-Level Change* (Milton Keynes: Open University Press, 2002)

Cohen, R. *The Unfolding of the Seasons* (London: Routledge, 1970)

Cresswell, Tim, *Place: An Introduction* (Chichester: John Wiley, 2015)

Cronon, William, (ed.) *Uncommon Ground* (New York: Norton, 1996)

Daston, Lorraine, and Galison, Peter, *Objectivity* (New York: Zone Books, 2007)

Davies, G. L. *The Earth in Decay: A History of British Geomorphology 1578 – 1878* (London: Macdonald, 1968)

Davies, Jeremy, *The Birth of the Anthropocene* (Oakland: University of California Press, 2016)

Deleuze, Giles, & Guattari, Felix, *A Thousand Plateaus* (Continuum: London, 2004)

Edmonds, Radcliffe. *Myths of the Underworld Journey: Plato, Aristophanes, and the Orphic Gold Tablets* (Cambridge: Cambridge University Press, 2012)

Evernden, Neil, *The Social Creation of Nature* (Baltimore: John Hopkins University Press, 1992)

Fairchild, Ian, and Baker, Andy, *Speleothem Science* (Chichester: Wiley-Blackwell 2012)

Falconer, Rachel, *Hell in Contemporary Literature: Western Descent Narratives since 1945* (Edinburgh: Edinburgh University Press, 2005)

Foltz, Bruce and Frodeman, Robert, eds. *Rethinking Nature: Essays in Environmental Philosophy* (Bloomington: Indiana University Press, 2004)

Freud, Sigmund, *The Interpretation of Dreams* trans. by James Strachey (London: Allen and Unwin, 1954)

Freud, Sigmund, *The Uncanny* trans. by David McLintock (London: Penguin, 2003)

Friedman, J.B. *Orpheus in the Middle Ages* (New York: Syracuse University Press, 2000)

Frodeman, Robert, *Geo-Logic: Breaking Ground between Philosophy and the Earth Sciences* (New York: State University of New York Press, 2003)

Garrard, Greg, *Ecocritism* (London: Routledge, 2004)

Guerlac, Henry, 'Joseph Black and Fixed Air. A Bicentenary Retrospective', *Isis*, 48, 2 (1957), p. 125.

Gillieson, David, *Caves: Process, Development, Management* (London: Blackwell, 1996)

Glacken, C.J. *Traces on the Rhodian Shore* (Berkeley: University of California Press, 1967)

Golinski, Jan, *Science as Public Culture: Chemistry and Enlightenment in Britain, 1760 – 1820* (Cambridge: Cambridge University Press, 1992)

Graves, Robert, *The White Goddess: A Historical Grammar of Poetic Myth* (London: Faber and Faber, 1999)

Gribbin, John, *Science: A History, 1543 – 2001* (London: Penguin, 2003)

Hardie, Philip, *The Last Trojan Hero: A Cultural History of Virgil's Aeneid* (London: I. B. Tauris, 2014)

Heidegger, Martin, *Being and Time* trans. by Joan Stambaugh (Albany: State of New York University Press, 2010)

Heringman, Noah, *Romantic Rocks, Aesthetic Geology* (New York: Cornell University Press, 2004)

Hill, Elaine, and Hall, Adrian, eds. *Northern Sump Index 2015* (Cave Diving Group Northern Section)

Hillman, James, *The Dream and the Underworld* (New York: Harper, 1979)

Hinchcliffe, Stephen, *Geographies of Nature* (London: Sage, 2007)

Holmes, Richard, *Shelley. The Pursuit* (London: Harper Perennial, 1974)

Huth, John, *The Lost Art of Finding our Way* (London: Belknap, 2013)

Ingold, Tim, *Being Alive: Essays on Movement, Knowledge and Description* (London: Routledge, 2011)

Inkpen, Rob, and Wilson, Graham, *Science, Philosophy and Physical Geography* (Abingdon: Routledge, 2013)

James, S. P. *Environmental Philosophy: An Introduction* (Cambridge: Polity, 2015)

Jarvis, Robin, *Romantic Writing and Pedestrian Travel* (London: Macmillan, 1997)

Kirtland-Wright, John, *Human Nature in Geography*. *Fourteen Papers, 1925 – 1965* (Cambridge, MA: Harvard University Press, 1966)

Kroeber, Karl, *Ecological Literary Criticism* (New York: Columbia University Press, 1994)

Kuhn, T. S. *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 2012)

Latour, Bruno, *Science in Action* (Cambridge, MA: Harvard University Press, 1987)

Leask, Nigel, *Curiosity and the Aesthetics of Travel Writing 1770 – 1840* (Oxford: Oxford University Press, 2002)

Leed, Eric, *The Mind of the Traveller: From Gilgamesh to Global Tourism* (New York: Basic Books, 1991)

Lefebvre, Henri, *The Production of Space* trans. by Donald Nicholson-Smith (London: Blackwell, 1991)

Leopold, Aldo, *A Sand County Almanac* (Oxford: Oxford University Press 1949)

Lewis-Williams, David *The Mind in the Cave* (London: Thames and Hudson, 2004)

Lingis, Alphonso, *The Imperative* (Bloomington: Indiana University Press, 1998)

Macey, J. D. 'Et in Arcadia Ego? Thomas Amory, Mary Hamilton, and the (Re)construction of Arcadia' in *Studies in Eighteenth Century Culture* Volume 31, 2002, pp. 191 - 214

Maskit, J. 'Something Wild? Deleuze and Guattari and the Impossibility of Wilderness' in Light, A. & Smith, J.M. eds, *Philosophy and Geography III: Philosophies of Place* (Rowman & Littlefield: Lanham, 1998)

Massey, Doreen, *Space, Place and Gender* (Cambridge: Polity, 1994)

Massey, Doreen, *For Space* (London: Sage, 2005)

McKusick, J.C. *Green Writing: Romanticism and Ecology* (New York: Palgrave Macmillan 2010)

McPhee, John, *Annals of the Former World* (New York: Farrar, Straus and Giroux, 2000)

Merleau-Ponty, Maurice, *The Visible and the Invisible,* trans. by Alphonso Lingis (Evanston: Northwestern University Press, 1968)

Merleau-Ponty, Maurice, *Phenomenology of Perception,* trans. by D. A. Landes (London: Routledge, 2012)

Merchant, Carolyn, *The Death of Nature: Women, Ecology and the Scientific Revolution* (New York: Harper One, 1990)

Midgley, Mary, *Science and Poetry* (London: Routledge, 2001)

Mills, Jon, *Underworlds: Philosophies of the Unconscious from Psychoanalysis to Metaphysics* (Hove: Routledge, 2014)

Morton, Timothy, *Hyperobjects. Philosophy and Ecology after the End of the World* (Minneapolis: University of Minnesota Press, 2013)

Mulvihill, J. 'Amory's John Buncle and Wordsworth's Excursion' in *Notes and Queries* Volume 37 (1), March 1990

Neville, J. *Representations of the Natural World in Old English Poetry* (Cambridge: University Press, 1999)

Nicolson, Marjorie Hope, *Mountain Gloom and Mountain Glory: The Development of the Aesthetics of the Infinite* (Seattle: University of Washington Press, 1997)

O'Connor, Ralph, *The Earth on Show: Fossils and the Poetics of Popular Science, 1802 – 1856* (Chicago: University of Chicago Press, 2007)

Oelschlaeger, Max, *The Idea of Wilderness* (New Haven: Yale University Press, 1991)

Otto, Rudolf, *The Idea of the Holy* trans. by John Harvey (Oxford: Oxford University Press, 1958)

Parsons, Graham, *Aesthetics and Nature* (London: Continuum, 2008)

Porter, Roy, *The Making of Geology: Earth Science in Britain 1660-1815* (Cambridge: Cambridge University Press, 1977)

Porter, Roy, *Enlightenment: Britain and the Creation of the Modern World* (London: Penguin, 2000)

Porter, Roy, *Flesh in the Age of Reason* (London: Allen Lane, 2003)

Rose, Gillian, *Feminism and Geography* (Cambridge: Polity, 1993)

Wroe, Ann, *Orpheus: The Song of Life* (London: Pimlico, 2011)

Rowland, Susan, *The Ecocritical Psyche* (London: Routledge, 2012)

Royle, Nicholas, *The Uncanny* (Manchester: Manchester University Press, 2003)

Rudd, G. *Greenery: Ecocritical readings of late medieval English literature* (Manchester: University Press, 2007)

Rudwick, Martin, *The Great Devonian Controversy: The Shaping if Scientific Knowledge among Gentlemanly Specialists* (Chicago: University of Chicago Press, 1988)

Rudwick, Martin, *The New Science of Geology: Studies in the Earth Sciences in the Age of Revolution* (Aldershot: Ashgate Variorum, 2004)

Rudwick, Martin, *Earth's Deep History* (Chicago: University of Chicago Press, 2014)

Ruston, Sharon, *Creating Romanticism: Case Studies in the Literature, Science and Medicine of the 1790s* (Basingstoke: Palgrave Macmillan, 2013)

Saito, Y. 'Appreciating Nature on its own Terms' pp. 141 – 155 in *The Aesthetics of the Natural Environment* eds. Carlson, Allen, and Berleant, Arnold (New York: Broadview Press, 2004)

Schama, Simon, *Landscape and Memory* (London: Fontana, 1996)

Shapin, Stephen, '"A Scholar and a Gentleman": The Problematic Identity of the Scientific Practitioner in Early Modern England' *History of Science* 29.3 (1991): 279-327

Shapin, Stephen, *A Social History of Truth, Civility and Science in 17th Century England* (Chicago: University of Chicago Press, 1994)

Shaw, Philip, *The Sublime* (London: Routledge, 2006)

Shaw, Trevor, 'John Hutton, 1740? – 1806. His "Tour to the Caves" and his Place in the History of Speleology' in *Studies in Speleology Vol. 2, Parts 3-4, 1970-71* pp. 109 - 128

Shaw, Trevor, *History of Cave Science: The exploration and Study of Limestone Caves to 1900* (Sydney: Sydney Speleological Society, 1979; repr. 1992)

Snyder, Gary, *The Practice of the Wild* (Emeryville: Shoemaker & Hoard, 1990)

Snyder, Gary, *A Place in Space* (New York: Counterpoint, 1995)

Strathern, Paul, *Mendeleyev's Dream: The Quest for the Elements* (London: Penguin, 2001)

Tally, R. T. *Spatiality* (Abingdon: Routledge, 2013)

Thomas, Keith, *Man and the Natural World: Changing Attitudes in England 1500 – 1800* (London: Penguin, 1983)

Thompson, Carl, *The Suffering Traveller and the Romantic Imagination* (Oxford: Oxford University Press, 2007)

Thompson, Carl, *Travel Writing* (London: Routledge, 2011)

Treftz, Jill Marie, 'The Significance of the Hawthorn Branch in Wordsworth's Peter Bell' in *ANQ: A Quarterly Journal of Short Articles, Notes and Reviews,* 2013 26: 1, 27 – 30.

Trott, Nicola Zoe, 'Wordsworth, Milton and the inward light' in *Milton, the Metaphysicals, and Romanticism* eds. Lisa Lowe and Anthony Harding (Cambridge: Cambridge University Press, 1994), pp. 114 – 135.

Tuan, Yi Fu, *Space and Place: The Perspective of Experience* (Minneapolis: University of Minnesota Press, 1977)

Tuan, Yi Fu, *Topophilia: A Study of Environmental Perception, Attitudes and Values* (New York: Columbia University Press, 1990)

Ustinova, Yulia, *Caves and the Ancient Greek Mind: Descending Underground in Search for Ultimate Truth* (Oxford: Oxford University Press, 2009)

Waltham, T. and Lowe, D. (eds.) *Caves and Karst of the Yorkshire Dales. Volume I* (Buxton: British Cave Research Association, 2013)

Waltham, T. and Lowe, D. (eds.) *Caves and Karst of the Yorkshire Dales. Volume II: The Caves* (Buxton: British Cave Research Association, 2017)

Warner, W. B. *Reading Clarissa: The Struggles of Interpretation* (New Haven: Yale University Press, 1979)

Wiley, Michael, *Romantic Geography: Wordsworth and Anglo-European Spaces* (Basingstoke: Palgrave Macmillan, 1998)

Willey, Basil, *The Eighteenth-Century Background* (London: ARK Paperbacks, 1986)

Wu, Duncan, and Trott, Nicola Zoe, 'Three Sources for Wordsworth's *Prelude* Cave' in *Notes and Queries* September 1991 p. 298

Wu, Duncan, *Wordsworth's Reading 1770 – 1799* (Cambridge: Cambridge University Press, 1993)

Wu, Duncan, *Wordsworth: An Inner Life* (Oxford: Blackwell, 2004)

Wulf, Andrea, *The Invention of Nature: The Adventures of Alexander von Humboldt, the Lost Hero of Science* (London: John Murray, 2015)

Wyatt, John, *Wordsworth and the Geologists* (Cambridge: Cambridge University Press, 1995)

Wylie, John, *Landscape* (London: Routledge, 2007)

Yoon, Carol, *Naming Nature: The Clash between Instinct and Science* (New York: Norton, 2009)